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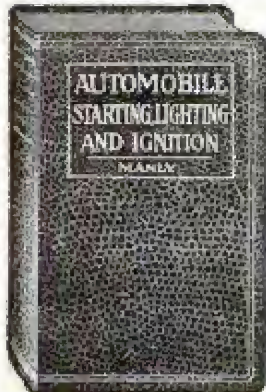
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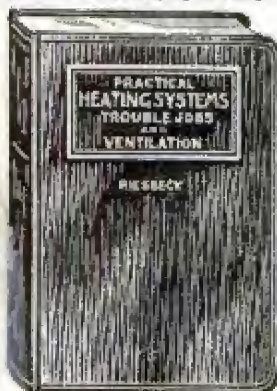
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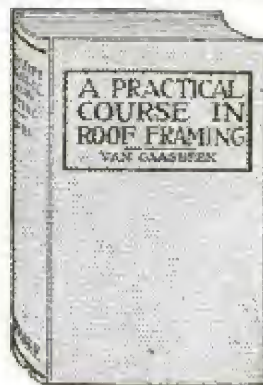
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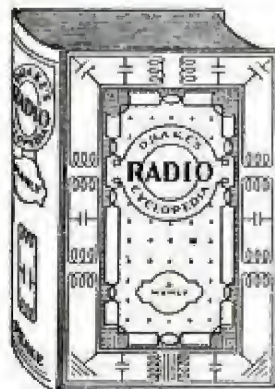
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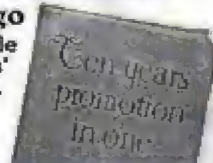
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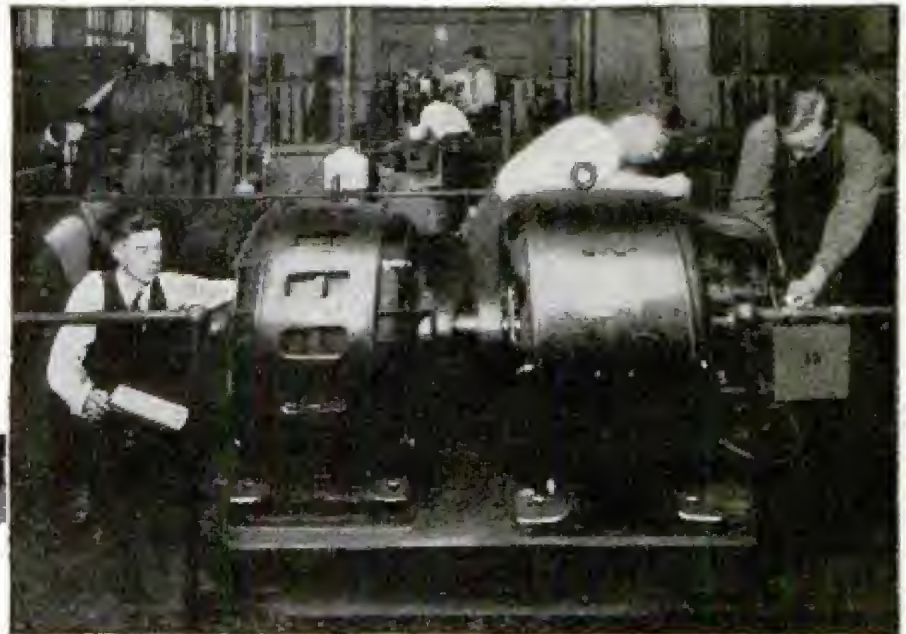
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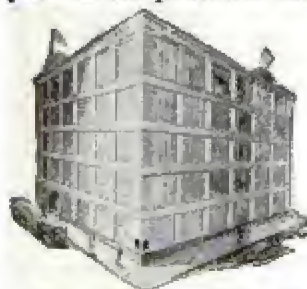
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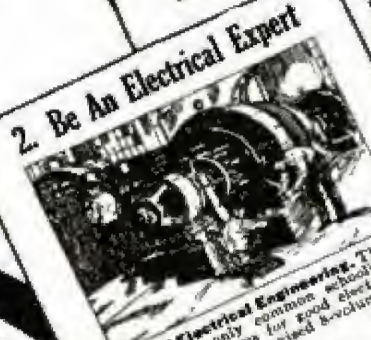
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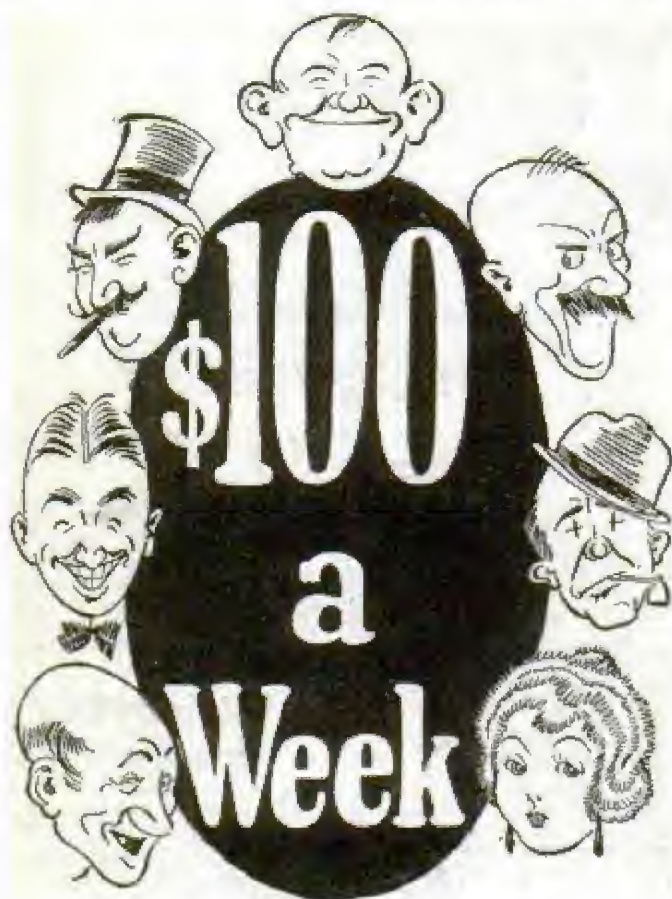
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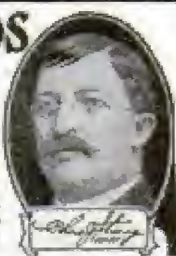
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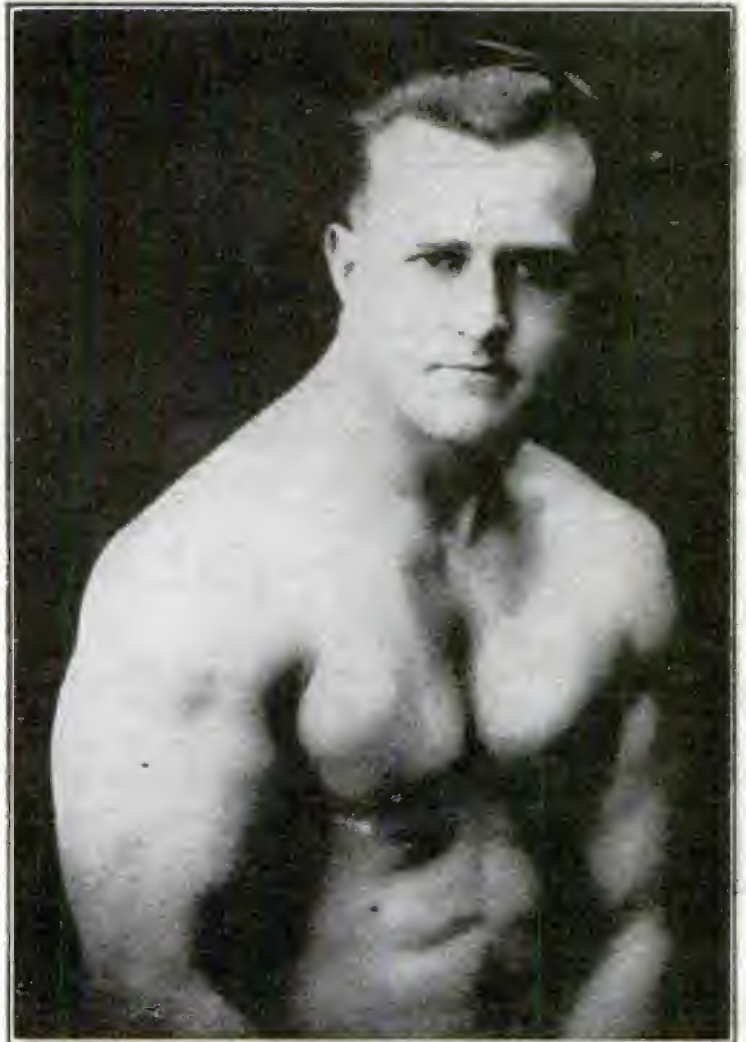
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These are the days that call for speed. It once took four weeks to cross the ocean—now it takes less than one. In older days it took years to develop a strong, healthy body. I can completely transform you in 90 days. Yes, make a complete change in your entire physical make-up. In 30 days I guarantee to increase your biceps one full inch. I also guarantee to increase your chest two inches. But I don't quit there. I don't stop till you're a finished athlete—a real strong man. I will broaden your shoulders, deepen your chest, strengthen your neck. I will give you the arms and legs of a Hercules. I will put an armor plate of muscle over your entire body. But with it come the strong, powerful lungs which enrich the blood, putting new life into your entire being. You will be bubbling over with strength, pep and vitality.

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Age..... Occupation.....



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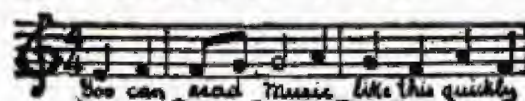
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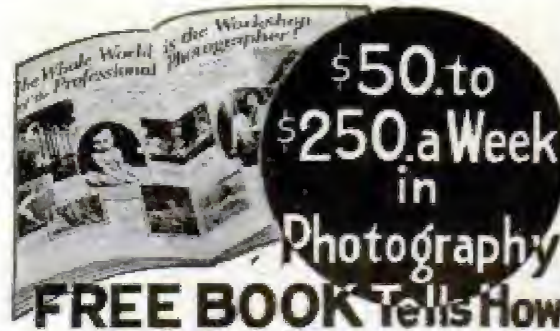
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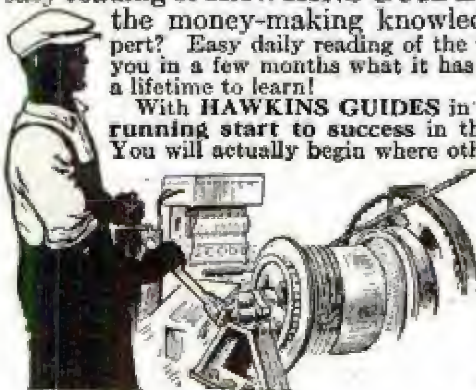


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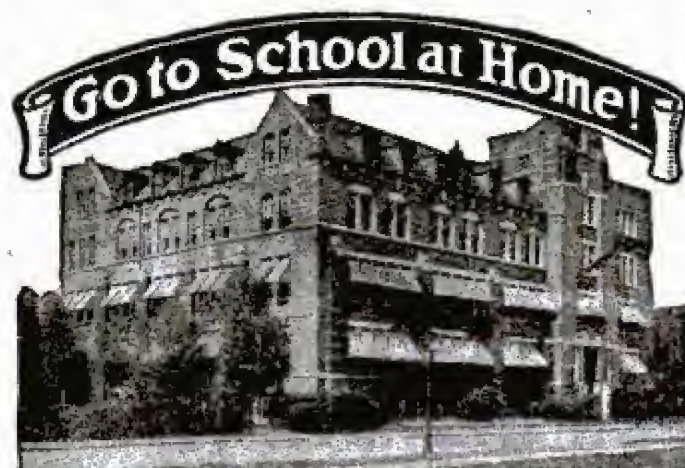
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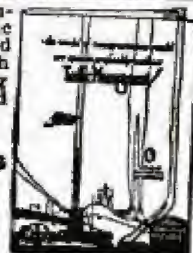
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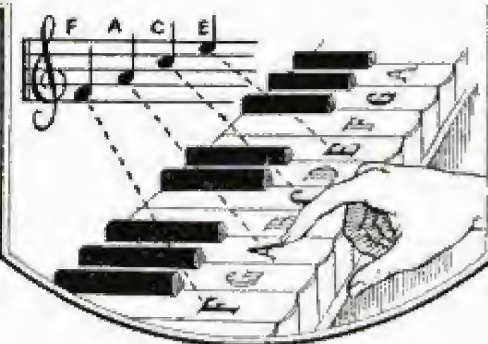
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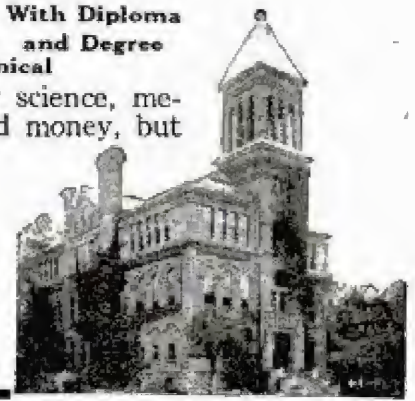
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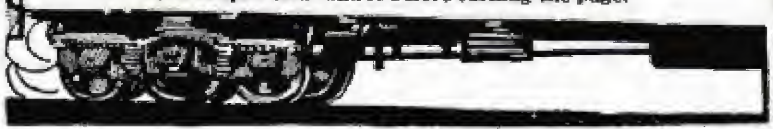
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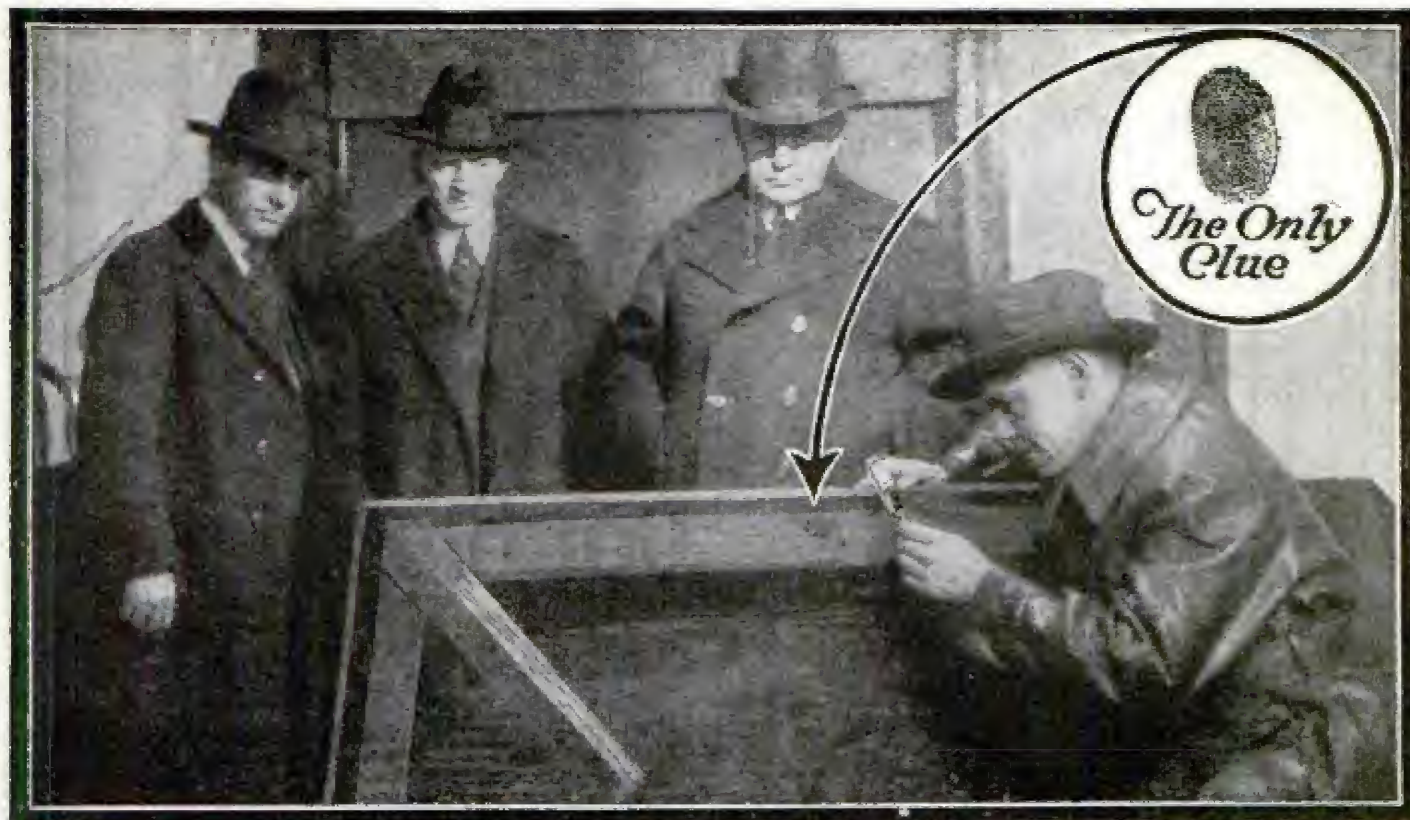
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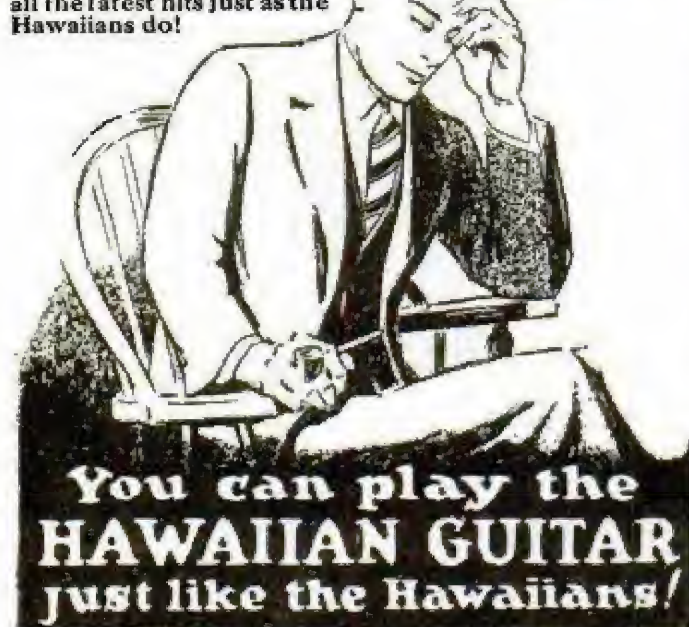
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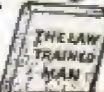


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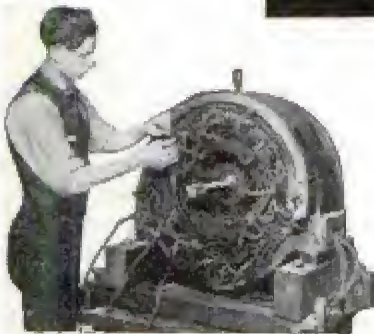
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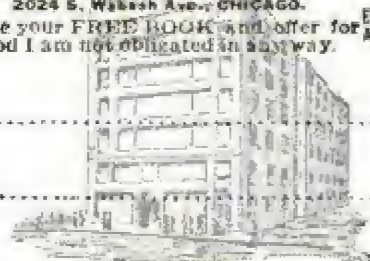
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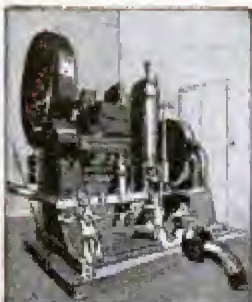
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3 Drafting

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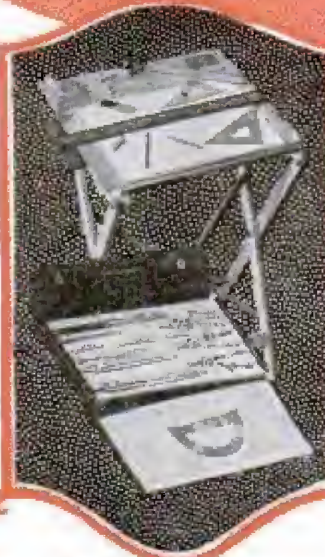
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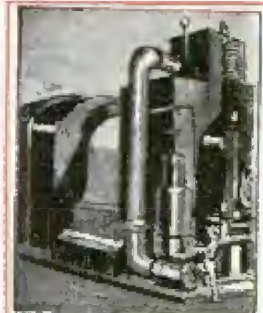
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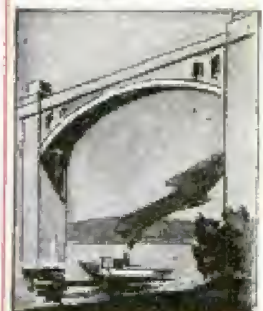
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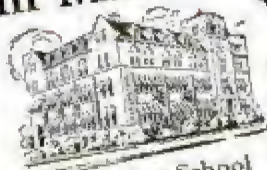


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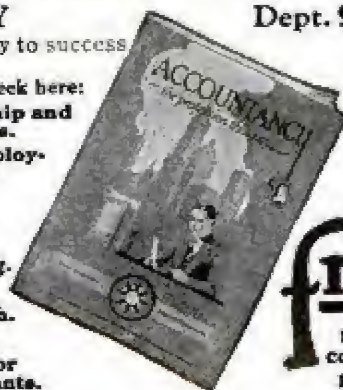
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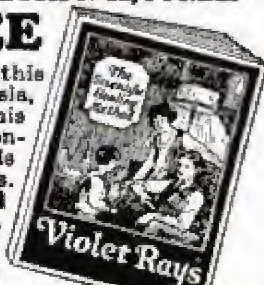
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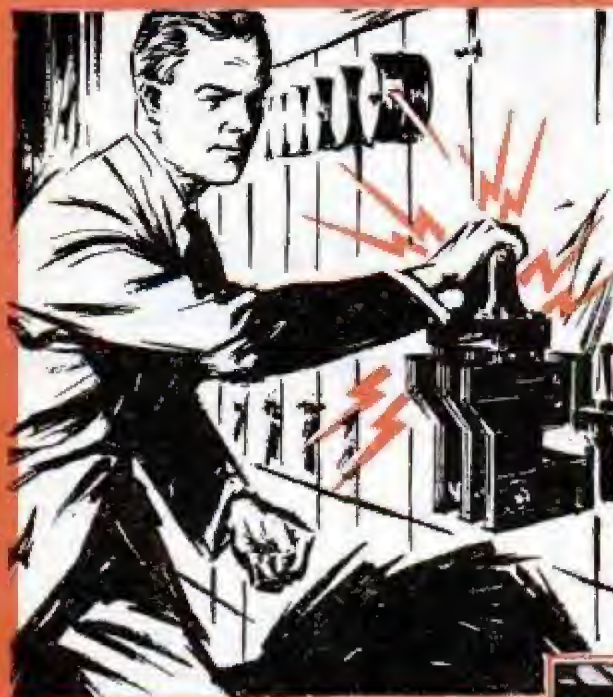
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29 Executives

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Chief Engineer Dunlap, Electrical Division,

to Electricity

— World's Greatest, Fastest Growing Industry

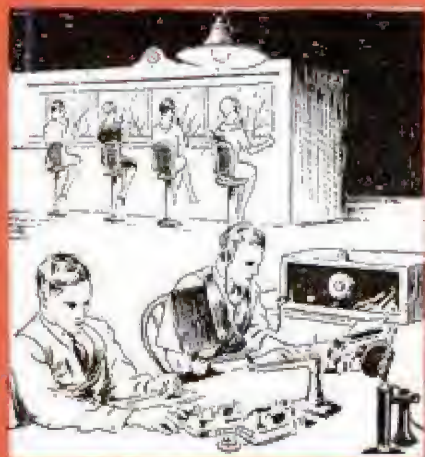
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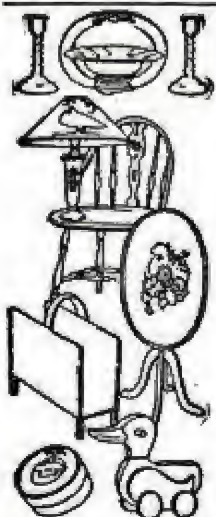
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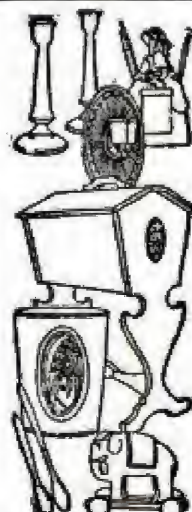
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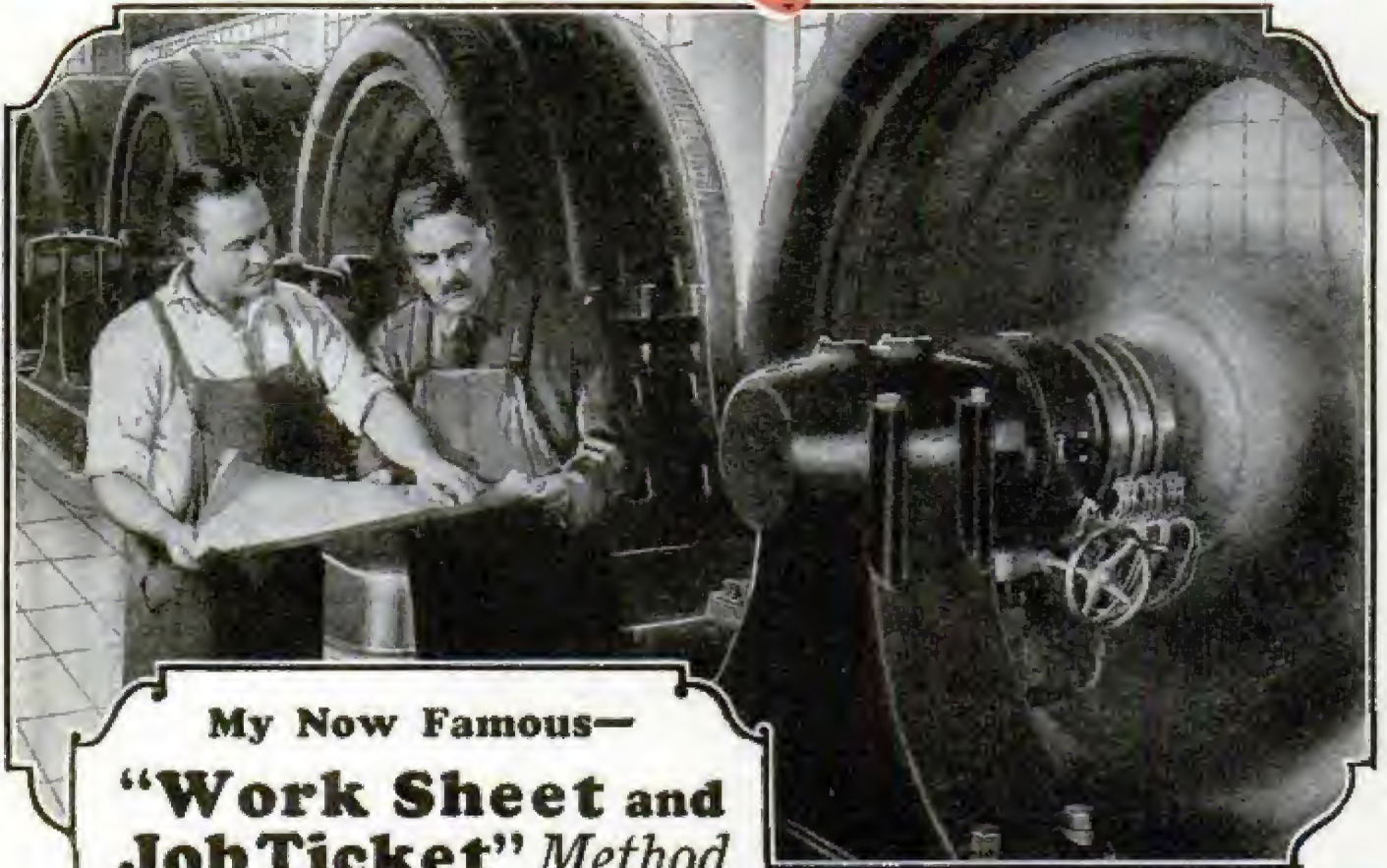
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LEARN Dry Cleaning. My Book used by millions, housewives, cleaners, tailors. Formulas for spotting, pressing, pleating, repairing. Send 50c. W. Hoffmann's Laboratories, Capitol Hill Sta., Denver, Colo.

CLASSIFIED list fifty German manufacturers. \$1.00. Maywell, 1110A Washington, Chicago.

MAKE and sell something every mechanic needs, write Chumpton Sales Co., Box 604, Minneapolis, Minn.

NEW System mail order: big profits, instructions free. Evans P. King Company, Wilmington, Del.

I EARNED \$50 weekly—Home-making wood toys. My 36 patterns and instructions \$1. Money back guarantee. Morton, 5937 Tracy, Kansas City, Mo.

MANUFACTURE new fast-selling novelties, toys, preparations, agent's goods. Free list of plans, patterns, processes. Manufacturer's Bureau, R39, 1127 East 31, Kansas City, Mo.

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MAIL-ORDER plans, complete—10c. Leyendecker, 163 Johnson Ave., Brooklyn.

MAKE money, get pleasure. Learn new art in few days. Complete directions \$1. Weldler, 5625 Annandale Blvd., Los Angeles.

MAKE toys, novelties, furniture: assorted patterns and instructions, \$1.00. Scroll saw free with order. Wm. Bogren, 3264 Hermans Ave., New York.

MAIL-DEALERS—Start Right, Grow, Succeed. Sensational Money Maker. Write Edls, Route 3, Box 31A, Stockton, Calif.

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ARTIFICIAL marble sanitary flooring instructions, covering wood or cement flooring 1/2 inch thick, fireproof, waterproof, all colors, low cost. Ornamental casting, concrete, plaster, papier-mache decorations, garden furniture, statuary, flexible molds, 18 years instructing the public; particulars and illustrations free. Chris. Mahler, Huntington, N. Y.

\$3,500 IN 17 weeks! That's what Charles F. Worthen made after reading my free book. Do as he did. Be a Real Estate Specialist. Use my successful system. Start at home in spare time. No capital or experience needed. Free book shows how. Address President, American Business Builders, Room 41-3, 18 East 18th St., New York.

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BIG bunch mail. Year 15c. Magazines, catalogues. Kentucky Agency, Covington, Ky.

MANUFACTURING Pays Big Profits. Latest, dependable Formulas, Processes, Trade-Secrets. Best sellers. Valuable information free. Specialty Mfg. Service, 801 So. Farragut, Bay City, Mich.

CAN you stand prosperity? Are you ready to make yours? We can show you the way to make big money. No peddling. No competition. F. D. Gibson Co., 209 Bell Block, Cincinnati, Ohio.

MIRRORS Resilvered at Home. Costs less 5 cents per square foot; you charge 75 cents. Immense profits plating like new; brass, worn-off autoparts, reflectors, tableware, stoves, etc. Outfits furnished. Details Free. Sprinkle, Plater, 127, Marion, Ind.

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RESPONSIBLE manufacturer wants competent men to manage office and salesmen. \$300 to \$1,500 necessary; will allow expenses to Baltimore if you qualify. Address Manager, 601 N. Eutaw St., Baltimore, Md.

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WE Start You in Business, furnishing everything; men and women, \$30.00 to \$100.00 weekly operating our "New System Specialty Candy Factories" anywhere. Opportunity lifetime; booklet free. W. Hillyer Ragsdale, Drawer 4, East Orange, N. J.

MECHANICS, painters, carpenters, start furniture refinishing, painting, handyman shop on nearly nothing; winning plan brings customers quickly. John Braceland, 1439 So. Ninth, Philadelphia, Pa.

MAIL Order Business Positively Your Big Opportunity. Start Right. Grow. Win. Free Circular. Send Today. Macrae, Publisher, 602M, Oregonian Building, Portland, Ore.

CHEMICAL Expert furnishes Manufacturing Formulas and Processes with complete working directions. Reliable individual service only. No list. Charges reasonable. Correspondence invited. Dr. Arthur Van-Heeden, 508 South Oakley, Chicago.

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TOMBSTONE Renewing: We will send amazing money getting process to 2 Men. Women or Boys to go partners working cemeteries; spare time or steady; lonesome work but dollars jingle. Sterling Specialty Co., 231 Federal, Denver, Colo.

500 FORMULAS and Big Catalog 24c Ideal Book Shop, Park Ridge, Ill.

TATTOO Remover Formula \$1.00. Supply Catalogue. "Waters," 965 Pittman, Detroit.

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100% PROFIT on Every Sale selling Christmas Greeting Cards in Box Assortments. Our wonderful Box Assortment is the finest published. Agents earn \$2 to \$4 per hour. We have a magnificent Box Assortment containing 21 high-grade Christmas Greeting Cards and Folders, each with envelope, Steel Engraved, Colored, Panoled, and Bordered. Sells for \$1.00; costs 50 cents. Nothing ever sold begins to compare with the sale of Christmas Box Assortments. Write immediately for particulars and free samples. Waltham Art Publishers, 7 Water St., Dept. B-26, Boston, Mass.

WHY Not Sell Us Your Spare Time, \$2.00 an hour, \$15.70 daily easy full time—(In Advance)? Send for sworn proof, introducing New Style Guaranteed Hosiery—57 styles, 39 colors, for Men, Women, Children; including latest "Silk to the Top" Ladies' Hose. No capital or experience needed. You simply take orders. We deliver and collect (or you can deliver—suit yourself); Credit given. Pay you daily. We furnish samples. Silk hose for your own use free. New Plan. Milton Mathews, Road 2569, Cincinnati, Ohio.

AGENTS: Make \$100 Weekly selling "Gray Seal." Automatically, Instantly and Permanently seals all tire punctures. Gives longer life to tires and tubes. Demonstration closes sale every time, with \$1.50 to \$3.00 profit for you. Exclusive territory given. Money-back guarantee. Write today for our Very Liberal Offer. Gray Seal Products Corp., 200 Rutger St., St. Louis, Mo.

TAILORING Agents. Earn \$35.00 to \$75.00 weekly, showing fine 100% Pure Virgin Wool \$23.50 suits, union hand-tailored to measure. Equal usual \$35 to \$40 suits. Old reliable \$4,000,000.00 firm offers pay in advance, exclusive territory, generous backing and big outfit of hundreds of large samples free. Write J. B. Simpson, 843 Adams St., Dept. 1381, Chicago.

AGENTS make \$3.00 an hour taking orders for our 40 fascinating Kitchen Specialties. No competition. Write quick. General Products Co., Dept. H 207, Newark, N. J.

LAMB'SWOOL Polishing Mittens, Brush—Newhall, 258 Broad, Lynn, Mass.

WANT \$15 a Day? New way to make quick cash profits selling fine shirts. Actual samples sent free. Write Fashionwear Shirt Co., L-943 Jackson St., Cincinnati, O.

PRIVATE brand Toilet Articles, Household Specialties, Perfumes, Soaps, Extracts, etc. We pack these goods for you under your private label. With your name on the goods you get all the repeat business. Highest quality merchandise. Extremely low prices. Immediate shipments on both large and small orders. Write at once for lowest wholesale prices and complete information regarding our amazing offer. Address Supply Department, National Scientific Laboratories, 1304 W. Broad, Richmond, Va.

THANCO Flavors—Bottle Yourself! Concentrated—add water! Free labels. Whirlwind Sellers! 500% profit! Lifetime opportunity! Write Thomas Manufacturing Company, Indianapolis, Ind.

AMAZING new device. Sharpens everything, even scissors. Over 100 big uses in every home. Also sells fast to Garages, Shops, etc. Many now making \$3-\$5 an hour. Everything furnished. Write for Free Outfit Offer. Central States Mfg. Co., Dept. L-930, St. Louis, Mo.

100 MORE active men to introduce Chieftain Guaranteed Tailored Shirts, 3 for \$4.95. Latest Novelties, colors. Dickman, Illinois, in 3 weeks made \$589; Sinton, Texas, in 12 days, \$219.00; Bend, Iowa, in 16 days, \$334.80. Why not you? No experience or capital needed. We deliver and collect. Full working outfit free. Cincinnati Shirt Company, Lane 1589, Cincinnati, Ohio.

AGENTS—Make \$15 Daily. Show samples and distribute teas, coffee, spices, extracts; 200 products; things people eat. I go 50-50 and furnish Chrysler closed car. Offer made to first person answering in your locality. Write or wire Health-O Quality Products Company, Dept. 101-J, Cincinnati, Ohio.

MAKE \$25.00 daily selling colored Raincoats and Slickers; Red, Blue, Green, Etc., \$2.95. Hat Free. Commissions daily. Outfit free. Elliott Bradley, 241 VanBuren, Dept. AB-9, Chicago.

IF I Send You a Suit made in latest style from finest goods, will you keep it, wear it, and show it to your friends as a sample of my sensational \$15.50 suits guaranteed regular \$40.00 values? Could you use \$5.00 an hour for a little spare time? If so, write me at once for my wonderful new proposition. Just write your name and address on a card and mail to Salesmanager, Peoria and Adams, Dept. 768, Chicago.

42.8 MILES on 1 gallon. Wonderful Moisture Gas Saver. All autos. 1 free. Critchlow, D-5-805, Wheaton, Ill.

COUNTY Representatives With Cars to demonstrate Webb's Tube Seal. Seals punctures, slow leaks and porous tubes. Reduces the cause of Rim Cuts and Blow-outs. Increases Tire Mileage. Positively not-injurious to Rubber. Webb's Gasoline Intensifier reduces Carbon deposits, increases Gasoline Mileage. "A regular Monkey Gland for Automobiles." Write for County Rights. Pat. Puncture Proof Products Co., 209 Anderson St., N. E., Pittsburgh, Penna.

REPRESENTATIVES wanted by over 500 manufacturers, offering real money making propositions. No need of being out of work. Write for Free Copy. Opportunity Magazine, 750 N. Michigan, Service Dept., Desk 2, Chicago.

OUR Agents average better than \$75 a week; Rich's pure fruit soft drink powders. Every home, store, drink dealer buys. Samples Free. Sol P. Rich Co., 622 S. Sangamon, Chicago.

AGENTS you want to earn money without interfering with your regular work. Write for free dress, slicker catalogue. Superbuilt, Box 453-A, Chicago.

"LIQUID-LEATHER" Fills Holes in Shoes, Rubbers, Tires. Dries Instantly. Pliable. Waterproof. Just Imported from France. Tube Retalls 75c—Cost 35c. Sells Housewives. Sub-Agents. Nullie Leather, Hartford, Conn.

PITCHMEN wanted sell eight pair men's fancy socks \$1.00, imperfect \$0.00 gross, \$10.00 gross, \$11.00 gross, \$12.00 gross, send \$42.00 for four gross pairs or \$10.50 one gross pairs assorted. Lewis Hosiery Co., 12 No. Third St., Philadelphia, Pa.

BIG money easily made without peddling or outfit. Free particulars, Elliot, 38 Elizabeth St., New York.

75c PROFIT on \$1.00 sale. Auto, furniture and glass cleaner. Your name on label. Exclusive rights; free sample. Mfg. E, 213 Griswold, Detroit, Mich.

NATIONALLY Known Organization now selling to retail trades is seeking men and women agents for profitable full or part time canvassing in every city. The product is a high grade refrigerator accessory, with a tremendous appeal to the housewife. Fully guaranteed and highly endorsed. Sells for One Dollar. Every refrigerator owner a prospect. 100 per cent profit on each sale. Exclusive territory for aggressive workers. Kanak Company, Inc., 18 East 41st St., New York City.

AGENTS—\$13.80 Daily in advance. Introducing New Insured Hosiery for men, women, children. Must wear or replaced free. 57 styles, 39 colors, including latest "Silk to the Top" Ladies' Hose. Nyland made \$395 in one month. Edwards, \$460.00. Mrs. Bone, \$425.45. Why not you? Even spare time should pay you \$3.00 an hour. No experience needed. We furnish samples. Silk hose for your own use free. New Plan. School line now ready. Write quick. Milton Mathews, Road 2569, Cincinnati, Ohio.

AGENTS start a permanent business of your own selling guaranteed hosiery and underwear worn all over the world. No capital or experience needed; many representatives make \$3,000 to \$5,000 per year. Become our district manager—get others working for you. Write for details to Malloch Knitting Mills, 579 Grant St., Grand Rapids, Mich.

HOOPER sold \$30 in 90 days, King 450 in 6 weeks. Improved Hydrostatic Gage shows gasoline supply on dash of all cars. No cutting or drilling, quick installation. Guaranteed 3 years. Lowest price ever made on dash gage. Big commission to salesmen. Write Kirstin, Box 1901, Escanaba, Mich.

QUICK Money. Our agents selling 2-3 dozen daily Vanhix garage-door holders. Every private garage owner instantly buys. Retail \$2.50 pair. Big proposition, whole or part time. Experience unnecessary. Exclusive territory. Write today. Vanhix Metal Products, 352 Mulberry St., Newark, N. J.

AGENTS: No investment necessary to handle new high-class advertising novelty with unusual motion-picture angle. Yearly repeat order feature. Both you and your salesmen build a large solid permanent business quickly. Just ready. Will close fast with capable men. Dept. C, Star & Studio Picture Co., 110 West 39th Street, New York.

SELL Surety, the Original, Genuine, powdered Hand Soap, and make \$5,000 yearly. We furnish sales plans, advertising, free samples. Write quick. Surety Mfg. Co., Dept. H9, 26 W. Washington, Chicago.

BIG pay every day! Complete guaranteed line direct to wearer—Dress Shirts, Work Shirts, Flannels, Overalls, Pants, Leather Coats, Sweaters, Playsuits. \$10-\$25 daily! Experience unnecessary. Big outfit free! Nimrod Co., Dept. 8, 4922-28 Lincoln Ave., Chicago.

MEN—Women, \$1.80 an hour—no less. Large mfg. Co., estab. 30 years. Starting new medalion dept. Amazing new sales plan. First 22 agents averaged \$1.80 an hour steady. Only one agent wanted in locality. Your own photo free as sample. Art Medalion Co., Chicago, Ill., Campbell Ave., at Jackson, Dept. 42.

75c PROFIT on \$1.00 sale. Auto, furniture and glass cleaner. Your name on label. Exclusive rights; free sample. Mfg. E, 213 Griswold, Detroit, Mich.

MEN and women. Establish paying business, spare time at home. \$1 starts or particulars free. Greene Laboratories, 198, Falmouth, Mass.

ATTRACTIVE proposition and exclusive territory to crew organizers. The V-W Window Ventilators are easily installed and removed by any person. Write now giving references. The V-W Ventilator Co., A. I. U. Bldg., Columbus, Ohio.

AGENTS—Valuable information for your address. "Master," \$16-20 Chestnut, St. Louis.

GOLD-LEAF Sign Letters: copyrighted Manufacturing Instructions; profits 1,000%. Johnston Co., Quincy, Ill.

\$16 A DAY Easy—I start you in auto accessory business; no investment; no experience necessary. Landis, 4206 Montrose Ave., Chicago.

ARVEO Polishing Cloths do the job the way it should be done. Write for our remarkable introductory selling plan to new agents. Arveo Industries, Box F 147, Grosse Ile, Mich.

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EMBOSSED, Engraved lodge emblems for Autos. L. Belle Mfg. Co., 96 Friendship, Providence, R. I.

EVERY Woman Wants a Sewing Set. Home Sewing Sets contain 142 useful sewing articles. \$4 an hour easily made with this 50c seller. Lee Bros., 128 E. 23rd St., New York.

AGENTS and Canvassers Wanted to sell five self-selling Auto Accessories direct to consumer, 100% profit. Write Amierregg Brothers, Mfrs., Algoma, Wis.

MAN Between 25 and 65 to Act as Manufacturer's agent. No investment necessary. A man with selling experience or willing to learn, who can command respect and who is willing to work, will find this a permanent business with a steady income of from \$175 to \$425 a month. Write to Thomas M. Judy, Box 966, Dayton, Ohio.

WILLIAMS' Powdered Hand Soap has taken auto owners by storm. Cleans dirtiest hands instantly. Easy demonstration sells on sight. Free Sample and particulars. W. B. Williams, Inc., Dept. 266, Mountclair, N. J.

MAKE Big Money supply tremendous demand. Everybody buys. Profits big. Get your free sample. Magic Products, Dept. 200, Oak and 31st, Kansas City, Mo.

AGENTS take orders for orthophonic portable phonographs. Sells \$19. Commission \$8. Sample free. Orthophonda Mfg. Co., 157-F Broadway, N. Y.

MANUFACTURE Chipped Glass Name and Number Plates, Mirrors, Signs, etc. Investigate! Radiant Signs, 15905 Alden, Detroit, Mich.

Big Money and Fast Sales. Every owner buys Gold Initials for his auto. You charge \$1.50; make \$1.35. Ten orders a day easy. Write for particulars and free samples. American Monogram Co., Dept. 40, East Orange, N. J.

AGENTS—\$6.00 hour earnings making four sales hour. Tremendous demand \$3.50 article; powerful selling plan. Pagley & Halgen, Dept. 40, Philadelphia, Pa.

AGENTS—Best Seller; Jem Rubber Repair for tires and tubes; supersedes vulcanization at a saving of over 800 per cent; put it on cold, it vulcanizes itself in two minutes, and is guaranteed to last the life of the tire or tube; sells to every auto owner and accessory dealer. For particulars how to make big money and free sample, address Amazon Rubber Co., Philadelphia, Pa., Dept. 565.

AGENTS—Men and Women making remarkable records with our Empress Quality Line of Household Specialties. Full or Spare Time. Hess Mfg. Co., Dept. C, Freeport, Ill.

AGENTS and distributors wanted to sell Acto Foot Salve. 200% profit. It makes good. Write for particulars. Trial box 25c. Audrey Agent Supply Co., Louisville, Ky., Box 2102.

WRITE for Opportunity List. Guaranteed high-class specialties. Every one "Leader." Miller Sales Company, Dept. P, Lexington, Ky.

AGENTS: Earn \$25.00 daily selling LA Fleurette Solid Perfume. Full or spare time. Sales guaranteed. Write, Quality Laboratories, 296 Broadway, New York.

EXCELLENT popular priced, self-fed automatic pencil—generous commission; particulars free; sample 75c. A. N. D., 317 Broadway, New York.

AUTO Fountain Sponge and Auto Mitten Dusters going over big. Send for circulars and free sample offer. National Dible Broom Co., St. Louis, Mo.

ARE You Old at Forty? See our advertisement on page 144 of this issue. The Electro Thermal Company, 2173 Main St., Steubenville, Ohio.

CASH Paid for Butterflies, Insects. See Sinclair Display Advertisement on page 86. 42 1/2 MILES on 1 gallon. Wonderful Moisture Gas Saver. All autos. 1 free. Critchlow, D6-865, Wheaton, Ill.

MIRRORS Redivered at Home. Costs Less 5 cents per square foot; you charge 75 cents. Immense profits plating autoparts, reflectors, tableware, stoves, refinishing metalware, etc. Outfits furnished. Details Free. Write Sprinkle, Plater, 128, Marion, Ind.

PARTNER wanted to introduce beautiful fit-to-measure Style-Arch shoes for women. No capital required. We furnish everything, including sample shoes. Amazing values at \$3.95 and \$4.95. Can make \$60 to \$125 in cash, plus semi-yearly share of company's profits. Write at once for full details. No experience necessary. Style-Arch Shoe Co., Desk V-102, Cincinnati, Ohio.

AGENTS: Make \$500.00 monthly. Pay daily. No investment. Rhinestone Initial buckles and Novelties. Sell easy everywhere. Exclusive territory. Chaston Novelty Co., 606 Blue Island, Chicago.

AGENTS, \$11 daily in advance. Bonus besides. Write orders for finest line guaranteed hosiery you ever saw. 126 styles, colors. We deliver or you deliver, suit yourself. Auto furnished. No experience needed. Spare time satisfactory. Credit given. Samples furnished. Wilkint Hosiery Co., Dept. 3031, Greenfield, Ohio.

EARN Dollar an hour selling pearl necklaces; Liberal profits. Hanover Trading, 925 Broadway, New York.

RELIABLE aggressive agents needed to sell Holley Suction and Force Pumps. Used in clearing plugged plumbing fixtures. Sizes for every need. Readily salable, and show good profit to consistent workers. The Holley is priced below competition and offers, at the same time, exceptional quality. Worthwhile for worth-while men. Alert Products, Inc., Dept. 50, Holley, N. Y.

AGENTS, \$300 month. Sell guaranteed silk hosiery. Must wear 7 months or replaced. New selling plan. We furnish auto. Silk hosiery for your own use. Write for samples. Betterkult Textile Co., Silk 831, Greenfield, Ohio.

AGENTS: 90c an hour to advertise and distribute samples to consumers. Write quick for territory and particulars. American Products Company, 9212 Monmouth, Cincinnati, Ohio.

RADIO Agents—Make Big Money—Easy! selling Marcolous New Sets and accessories. Buy from factory at lowest prices. Get Big New Catalog with thousands of nationally advertised bargains. Free Call Book. Write today. American Auto and Radio Co., Dept. 268, Radio Bldg., Kansas City, Mo.

\$100.00 WEEKLY! Two Suits or Suit and Overcoat \$33.50. All Wool—Made to measure. Commission \$6.00-\$7.50. Outfit Free. Garfield Tailors, 111557 Milwaukee, Chicago.

GOOD money made in handling our new crumblers breadknife. Never before offered. New Patent. Fast Seller. Send 50 cents today for sample and proposition. Lindsay Sales Co., 515 Case Bldg., 82 St. Paul St., Rochester, N. Y.

AGENTS: Sensational profits taking orders for Taylor made-to-measure caps for men, and women's Bobette hats with purse to match. \$75 to \$150 every week. Pay in advance. We deliver. Outfit free. Write quick. Taylor Cap Manufacturers, Desk R-11, Cincinnati, Ohio.

AGENTS—Make a dollar an hour. Sell new kind of sharpeners. Sharpens all knives and tools quickly. Demonstrating sample free. Premier Mfg. Company, Dept. 71, Detroit, Mich.

\$50,000. PICTURE Man Friedman made canvassing. Beginners can make \$100.00 weekly with my sales talk. Experienced men make more. Free book. "Profits in Portraits" explains. Samples Free. Picture Man Friedman, Dept. 8-L, 541 W. Lake, Chicago.

AGENTS—New Plan, makes it easy to earn \$50.00 to \$100.00 weekly, selling shirts direct to wearer. No capital or experience needed. Represent a real manufacturer. Write now for Free Samples. Madison Company, 566 Broadway, New York.

MAKE \$100 weekly supplying demand for new invention. Makes autos run on 7% gasoline. Free sample. Write Whirlwind Co., 1041-360 Winnebago, Milwaukee, Wis.

JUST Out—New Patented Apron. No strings or straps—\$20.00 a day every day; over 100% profit; commissions daily. Write for free offer. Sta-Put Co., Dept. 209, St. Louis, Mo.

AGENTS, portraits, photo-pillow tops, frames, sheet pictures, medallions, photo-jewelry, guaranteed hose, laundry tablets, food products, toilet requisites, luminous crucifixes. Catalog 50 specialties free. 30 days' credit. Jas. C. Bailey, Dept. C-9, Chicago.

Will you wear a pair of genuine tailor-made shoes at my expense? Will you show them to your friends and take their orders? I will also send you free our big selling outfit showing 70 shoe styles and 60 actual leather samples. I pay my agents \$8.09 daily. Write quick. Tailor-Made Shoe System, 232 Wrightwood, Dept. AA-9, Chicago.

Big Winner for Agents. New patented cigarette case. Holds package cigarettes and box safety matches; beautiful, compact, flexible container; large profits; write for liberal proposition. All-in-One, Dept. A-9, 2819 Portland Ave., Minneapolis, Minn.

CAN You Sell Gas at 5c a Gallon? If so, write us. We guarantee distributors \$15 a day. Blanche Co., 154 E. Erie Street, Dept. 805 M-X, Chicago.

\$8 TO \$12 a day. Man or Woman Wanted. Part or full time. To distribute well known line of cosmetics and toilet preparations in their locality. No experience necessary. We train you. Big profits. Large repeat sales. Free sample offer. Write Franco-American Hygienic Company, 123 E. 15th Street, Chicago, Ill.

PRODUCE Perfect Products yourself. Thaxly Formulas, Processes, Trade-Secrets show the way. All lines. Modern master methods. Catalog, circulars free. B. Thaxly Co., Washington, D. C.

WE Start You in Business, furnishing everything; men and women, \$35.00 to \$100.00 weekly operating our "New System Specialty Candy Factories." Few dollars start you home or small room anywhere. Booklet free. W. Hillier Ragsdale, Drawer 350, East Orange, N. J.

MAKE \$18 a Day and More. Everyone needs shoes. Sell Mason's all-leather shoes below store prices. 85 styles—men's, women's, children's. No experience needed. Big outfit free. Mason Shoe Mfg. Co., Dept. 259, Chippewa Falls, Wis.

NEW Dynamo Timer guaranteed life of car. 12,000,000 prospects. Earn \$100 weekly. Write today. Free sample. Dynamo Co., 426-1111 Eleventh St., Milwaukee, Wis.

\$30.00 A DAY Guaranteed to Workers taking orders for Goodwear tailored-to-measure clothes at sensational new low price. Tremendous assortment Virgin Wool fabrics. Biggest cash commissions paid daily and special cash bonus besides, makes our best paying line in America. \$25.00 Sales Outfit Free. Exclusive Territory. Write at once to Dept. 167, Goodwear Chicago, Inc., 814 West Adams, Chicago.

\$25 DAILY showing \$2.98 slickers, \$1.25 gift to customer makes sales easy. Outfit free. American, 724 P, Roosevelt, Chicago.

\$18 TO \$25 daily. Biggest selling line of 2-piece suits, \$9.95 and \$12.50; 3-piece wool suit, \$17.95 (regular \$28.00 value). All-wool overcoat, \$18.50. Splendid raincoats, slickers and boys' suits. Biggest commissions. Free outfit. "Jim" Foster, Inc., Dept. 29, 2350 S. Spaulding Ave., Chicago, Ill.

MAKE \$12 a day from start and liberal bonus selling Pioneer \$23.50 all-wool tailoring. Commissions paid in advance. Striking leather brief case and 100 large cloth samples furnished. We train the inexperienced. Write now to Pioneer Tailoring Co., 159 W. Harrison, Dept. G-1117, Chicago.

MAKE \$1,000 before Christmas selling exclusive personal Christmas cards in distinctive steel engraved designs. Expensive Sample Book free. Wetmore, James and Sugden, Rochester, N. Y.

MEN—Women—Sell beautiful household linens; wholesale prices. Big commissions. Everybody buys. Full-spate time. Milton Linens, 354 Fourth Avenue, Dept. 20, New York.

If you are a man worthy of the name and not afraid to work, I'll bet you \$50.00 you can't work for us thirty days and earn less than \$200.00. Think I'm bluffing? Then answer this ad and show me up. Openings for managers. Wonder Box sells on sight. The best selling proposition in America today. Write Tom Walker, Dept. 120, Pittsburgh, Pa.

REAL Whirlwind Seller—Nopolout Custom Shirt. Every man buys them. Patented—no competition. Liberal commission. Free selling kit. Make \$15 up daily taking orders direct from consumer at manufacturer's prices. District or local agents. Write Nopolout Shirt Co., Dept. Y, Hazleton, Pa.

\$60-\$200 A WEEK. Genuine Gold Letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 438-B North Clark, Chicago.

AGENTS: both sexes, we manufacture and control new household article. Fast seller. Big profits. Exclusive territory. Write now. Connolly, 123 Liberty St., New York.

SEND name, address on postcard. Free introductory copy Salesology Magazine; contains 1,000 money-making opportunities. Offered by big reliable firms; no obligations. Salesology Magazine, Desk B-38, 500 No. Dearborn, Chicago.

32 SECONDS complete tire change by Deemer, Ohio, with Morey Quick Action Rim Tool. Sold, singly, 49 three days, cleared \$100. Anderson, Mont., sold 1400 in 14 weeks. Get details for good territory. Harvest time Now. M. Morey Rim Tool, Buffalo, N. Y.

AT Last! Diamond Rival Discovered! Amazing blue white Rajah Gem astounds jewelry world and deceives experts. Beautiful sample case free! \$100 weekly. Quick! Rajah Diamond Co., Dept. F20, Salisbury, N. C.

\$31.00 PROFIT—with \$1.50 Outfit—Big Money—Easy Work. Selling Gold Monograms for Automobiles, Luggage, Windows, Wagons. No Experience. No License. "Samples Free." NuLife Monograms, Hartford, Conn.

SELL men's neckwear; wonderful proposition. Astor, 318-M Broadway, New York.

DO you want good live agents—fellows who can get the business? Ask me how others are doing it. I'll gladly render the necessary assistance without cost to you. Address, M. L. Rond, Mgr. Classified Advertising, Popular Mechanics Magazine, Chicago.

AGENTS. Get our prices on Coffee, Tea, Desserts, Soaps, Perfumes, etc. Endless variety, superb quality, quick service. Sample display free. Address Blair Laboratories, Lynchburg, Va.

AGENTS: Our gold-eyed Needle Cases are wonderful sellers; immense profits; \$50 to \$300 weekly; proof and particulars free; sample outfit 10c; factory prices. Paty Needle Co., 231 Davis Square, Somerville, Mass.

CALIFORNIA perfumed heads selling like hot cakes. Agents coinmg money. Big profits. Catalog free. Mission Factory P., 2328 W. Pico, Los Angeles, Calif.

HUNDREDS of manufacturers, formerly agents selling other goods now owe their success to Miller's Guaranteed Formulas for making biggest-selling, advertised specialties in all lines. Investment small. No machinery needed. Profits great. Make your own goods—get the profit you're entitled to. Write today for my "eye-opening" literature. It's free and tells all. Miller, Chemist, 1706-W Jetton, Tampa, Fla.

ATLAS Sign Works for Beautiful Gold Window Letters. Penny Each! Why pay 8c? Write for Free Samples. F1032 E. 55th St., Chicago.

42.8 MILES on 1 gallon. Wonderful Moisture Gas Saver. All autos. 1 free. Critchlow, D3-805, Wheaton, Ill.

WE Start You Without a Dollar. Soaps, Extracts, Perfumes, Toilet Goods. Experience unnecessary. Carnation Co., Dept 2480, St. Louis.

AGENTS—Make a dollar an hour. Sell Mendets, a patent patch for instantly mending leaks in all utensils. Sample package free. Collette Mfg. Co., Dept. 404, Amsterdam, N. Y.

AGENTS make \$100 week placing advertising Cigar Lighters with glass front. Every dealer wants one. Write for free plan. Drake Mfg. Co., Dept. M, Milwaukee, Wis.

NO Dull Times Selling Food. People must eat. Federal distributors make big money; \$3,000 yearly and up. No capital or experience needed; guaranteed sales; unsold goods may be returned. We furnish you with sample case, license and Free Samples for customers—Sure repeat orders. Exclusive territory. Ask now! Federal Pure Food Co., A2307 Archer, Chicago.

POLMET—The Wonderful Polishing Cloth that cleans all metals without liquid, paste or powder. Approved by "Good Housekeeping" and "Modern Priscilla"—sells fast at 25c. Sample free. Gale & Co., Inc., 13 Edinboro St., Boston.

PHOTO Medallion Men and Women, the largest line of Photo Novelties in the world. Lowest prices, quickest service. Send for catalogue showing over 200 money makers. Photo medallions, photo medallion clocks, photo mirrors, photo fountain pens, photo powder compacts, photo jewelry and photo buttons. Gibson Photo Jewelry Co., 608-614 Gravesend Ave., Brooklyn, N. Y.

AUTO owner tire agent wanted each locality to use and take orders for hand made Mellinger cord and balloon tires; guarantee bond 15,000 miles; shipped prepaid on approval; get your tires free; no capital or experience required; make \$100 to \$300 weekly. Write for wholesale prices and sample kit. Address Mellinger Tire Co., Dept. 400, Kansas City, Mo., or Dept. 400, Philadelphia, Pa., or Dept. 400, Oakland, Calif.

GENUINE Gold Leaf Letters anyone can put on store windows. Guaranteed to never tarnish. Large Profits. Enormous Demand. Free Samples. Write today. Metallic Letter Co., 438-D North Clark, Chicago.

AGENTS—N-R-G Laundry Tablets, the old reliable moneymaker for live agents. Millions sold—200% profit—sales waiting for you. Clothes washed spotlessly clean in 10 minutes without rubbing. Free samples. N-R-G Company, 230 W. Superior, Chicago.

\$50.00 WEEKLY easy. Applying Gold Initials on Automobiles. No experience needed. \$1.45 profit every \$1.50 job. Free Samples. "Raleco Monograms," 1043 Washington, Boston, Mass.

AGENTS: 500% profit. "Happy Home Make Shampoo" builds your own big business. Martin of Indiana made \$75.00 in one day. Missouri man made \$750.00 one month. Exclusive territory. Geo. A. Schmidt & Co., Dept. P, 238 W. North Ave., Chicago.

REPLATE brassy worn-off Automobile parts, Reflectors, Bath Room Fixtures, Worn Spoons, Forks, etc., with pure silver. Looks like new. Use U-Kan-Plate Polish. Positively no mercury. \$1.00 half pints. Post Paid. Satisfaction Guaranteed. Agents wanted. Dept. A, U-Kan-Plate Co., Philadelphia.

ATLAS Sign Works for Beautiful Gold Window Letters. Penny Each! Why pay 8c? Write for Free Samples. G1032 E. 55th St., Chicago.

AGENTS! \$5.00 to \$10.00 profit each sale with our New Octagon Portraits and Frames. \$50 to \$75 weekly easy. Catalog free. Write Linder Art Company, 551 W. Washington St., Chicago.

AGENTS make \$10.00 Daily selling Non-Splash Water Filters on sight. Best canvasser's article on market. Investigate. Write for particulars. Desk 14, Seed Filter Company, 73 Franklin Street, New York.

AGENTS—Mosco Corn and Calious Remover will build you a steady repeat business. Send today for pocket size trial outfit. The Moss Company, 380 Searle Bldg., Rochester, N. Y.

100% PROFIT. Every home buys "The Home Patrol" Burglar Alarm. Automatically sounds alarm and locks window. Agents coinmg money. Particulars free. Tuerk Mfg. Co., 32 No. Jefferson St., Chicago.

FIBRE Brooms—detachable handles, fine finish. Good profits, repeat sales. The Fibre Broom People, 147-C New Jersey Ave., Brooklyn, N. Y.

AGENTS. Hostery NuLife, positively prevents run in silk hosiery, lingerie, etc. Every woman buys. Enormous profits. Write today. Wright Supply Co., Box 42, W. Orange, N. J.

\$1,000.00 CLEARED in 30 days by one agent. New Amazing Cleaner. Sample Free. Bestever Products Company, 4317-P, Irving Park, Chicago.

AUTOMOBILE Specialties. Guaranteed formulas for all latest money makers. Lowest prices. Write for free lists. Murphy, Chemist, Tulunga, Calif.

BIG profits distributing 5c candy specialties to dealers. Fast sellers. Exclusive territory. Universal Sales Company, 631-B Wilson Ave., Brooklyn, N. Y.

AGENTS—250% profit selling exclusive new process Artistic Signs. Finest selection of stock signs in the country, barring none. Details free. Sample 10c. Artistic Signs, 799-R Broadway, New York, N. Y.

SEND 25 cents for a one dollar Cigar Lighter, and learn how to make \$10 a day. Particulars free. Rapid Mfg. Co., 799 Broadway, New York City.

200% PROFIT. Fast seller. Cleaner Polish for autos, furniture, metal, glass. Particulars and sample free. Deal Laboratories, Springfield, Mich.

GOLD Sign Letters. \$9.75 for Thousand! Non-Tarnishable. Free samples. Catalogue. Atlas Sign Works, A1032 E. 55th St., Chicago.

SELL Our Handy Wire Stretcher, a simple, practical fence-repairing device. Hawbaker Stretcher Co., Elmore, Minn.

MONOGRAM Automobiles. \$1.35 Profit ten minutes' work; every owner wants them; millions without; particulars free. Motorists Accessories Co., Mansfield, Ohio.

TOMBSTONE Cleaning; lonesome work, but dollars jingle. See under classification (Formulas).

AGENTS Wanted for fast, easy seller—Marvel pipe cleaner; literature free. Costick Products, 400 West 23rd, New York.

NEW, Fast Seller: 150% profit; "Best-ever Powdered Hand Soap"; removes grease, paint, ink, dirt; great repeater. Sample Free. Bestever Prod. Co., 4319-P, Irving Park, Chicago.

PORTHAIT Agents—Write for new Catalogue—Enlargements, Frames, Medallions, Sheet Pictures, Luminous Crucifixes. Adam J. Kroll & Co., 2539 So. State St., Chicago, Ill.

WANT Distributing Agent for Handslick, powdered hand soap; removes anything from hands; everybody a customer; sample free. Solar Products Co., J-2142 S. Troy, Chicago.

ALL-YEAR-ROUND profitable business selling wonderful new water softener and cleaner. Removes grease, oil, ink and dirt quickly. Every home and business place a live prospect. 100% profit. Big repeat orders. Exclusive territory. Write for free sample. Seacoast Laboratories, Sea Bright, N. J.

GOLD Leaf window letters and script signs. No experience; 500% profit. Samples free. Consolidated, 69-U West VanBuren, Chicago.

REMNANT Store, Bethel, Ohio. Greatest Dry Goods Bargains on Earth. Agents and Dealers.

AGENTS—Clever Invention! Inkspoon makes every pen a fountain pen. Fast office seller; big profit, demand increasing everywhere. Exclusive territory offered. Sample free. H. Marul Company, Tribune Bldg., New York, N. Y.

GET Our Free Sample Case—Toilet articles, perfumes and specialties. Wonderfully profitable. La Derma Co., Dept. A, St. Louis, Mo.

BIG Profits: Steady Income our line food products, toilet articles, soaps. No cash or experience needed. Sample case free. Write Linro Co., Dept. 242, St. Louis, Mo.

OVER 100% Profit. Self Lighting Gas and Cigar Lighters; Everybody interested, repeat business. Sell individuals, dealers, subagents. Particulars Free. P. Bernhardt, 127 West 30th St., New York.

UNDER Your Name or Brand, Sell Our Laundry Tablets. Amazing profits. Samples, circulars free with order. Costick Products, 400 West 23rd, New York.

EARN \$10 daily silvering mirrors, plating, refinishing metalware, chandeliers, head-lights, headstands. Outfits furnished. E. Decie Laboratories, 152 E. 23d St., New York.

ONE of the biggest mails on earth. Sent to any address for 10c. Louisiana Distributing Service, Dept. PM, Harmon, La.

MAN in each town to plate auto parts, reflectors, bathroom fixtures, refinish beds, mirrors, chandeliers; by new method. No capital or experience required. Simple plan of manufacturing at home starts you in big money-making business. Outfit furnished. Free particulars and proofs. Gun Metal Co., Ave. H, Decatur, Ill.

OUR Luminous Crucifix Shines in the Dark. Every one amazed at the wonderful effect. Easily demonstrated. Easily sold. W. G. Hannan Co., Dept. B, 2539 So. State St., Chicago.

A BUSINESS of Your Own—Making Sparkling Glass Name and Number Plates, Checkerboards, Signs. Big Book and Sample Free. E. Palmer, 512 Wooster, Ohio.

THREAD-CUTTING Thimble 25c. Seller Sample 15c. Irvel, 3973 Elston, Chicago.

WHERE to Buy Half Million Articles Wholesale. 72-page Directory—1927 Edition. Distributors wanted. Pruitt System, Brookfield, Ill.

PATENTS. Time counts in applying for patents. Don't risk delay in protecting your ideas. Send sketch or model for instruction or write for free book "How to Obtain a Patent" and "Record of Invention" form. No charge for information on how to proceed. Communications strictly confidential. Prompt, careful, efficient service. Clarence A. O'Brien, Registered Patent Attorney, Security Bank Building (directly across street from Patent Office), Washington, D. C. See pages 128 and 129.

AGENTS wanted to sell Velvet Hand Soap, a very fine mechanics' hand soap; this soap is a good seller with unusual merits. One giving their entire time can make a very fine commission. However, we would like some to take as side line. Territory rights given. Velvet Chemical Company, 30 N. Michigan Ave., Chicago.

SOMETHING New. Every motorist a buyer of our electro-magnetic-emergency Wenderlamp; takes only one minute to demonstrate and make a sale; no experience necessary; \$5.00 an hour easily made; full time or evenings. Write for sample. Wenderlamp Co., 926 Pisk Bldg., Dept. 19-A, New York.

TEST Big Money-Maker at our risk. Will send sample patented wringer mop on approval. Many eager buyers. Kleanzy Mop Co., Dept. G9, Delphos, Ohio.

MAKE \$20 daily selling \$1.00 changeable-letter store window display sign. Experience unnecessary. Get free sample offer. Maze Company, 544 W. Washington Street, Chicago.

HIGH-GRADE SALESMEN WANTED

\$75.00 TO \$150.00 per week is what our salesmen make steadily selling our Made-to-Measure Clothes. Highest commissions paid daily. Free \$40.00 selling equipment, including 200 all-wool fabrics and all sales helps in beautiful leather carrying case. Our prices save customers \$15.00-\$25.00 over local stores. Six-day delivery schedule. Fall lines now ready. Write for full particulars and free equipment today. Experience unnecessary. Tell us all about yourself. Edward E. Strauss & Co., Inc., 400 S. Market St., Chicago, Dept. 102.

\$20.00 DAY extra! Newly discovered warm, heavy, all-wool cloth. We call it Motortex. Tailored into dressy, serviceable, latest suit. Shower-proof. Spot-proof. Worth \$35.00. Only \$10.95. Pays \$3.00 and \$4.00 commissions. Add to your line. Two suits in one. Lawyers, Bankers, Doctors, Office Workers, Factory Men, Outdoor Workers—they all buy. Has 37 features. No competition. Expensive outfit free. Harrison Bros., Dept. 565, 133 West 21st St., New York.

DEMAND for Electric Window Displays is Established. Our Hustlers easily hitting \$100 weekly with the Leader—Magic Window Salesman—Color, Light, Motion. High-class. Buyers fall quick on demonstration. Greatest quick-change Letter System known, and new, snappy, Two-color Poster Service the answer. Live salesmen getting protected territory now. Display Products Co., A407-9 East 31st, Kansas City, Mo.

TRAVELING Salesmen Calling on Retail Stores wanted by large manufacturer of fast-selling specialties entirely different from the average. Year-round sales, main or sideline. Big commission paid immediately on original and repeat business. Opportunity for well paid and permanent connection with old-established firm. If not making \$150 weekly, write today. Union Specialty Works, Dept. 229, Boonville, N. Y.

ONE sale daily means \$300 monthly. Smallwood sold twenty in three hours. Improved 3-lb. Calculator. Retail \$15.00. Work equals costly machines. Fully guaranteed. For details, Trial Offer and protected territory, address Lightning Calculator Co., Dept. F, Grand Rapids, Mich.

SALESMEN, \$2 In Your Pocket Every 15 Minutes. Just out, sensational advertising novelty with fast-selling movie angle. New. No competition. Sells to stores on sight. Big cash commissions in advance. Full or spare time. Free illustrated pamphlet and sales plan. Be first in your territory. Write today or you lose money. Star & Studio Picture Co., Dept. D., 1400 N. Wabash, New York.

HUNDRED dollars up weekly guaranteed selling necessities every business must buy. Experience unnecessary. Opportunity unlimited. Going big. Coast to Coast. Rush reply. Dept. 5, Kaiser & Blair, Inc., Cincinnati, Ohio.

EARN \$20 a Day. Establish income for life selling for \$1 a year \$1,500 accident policy. Write W. C. Stone, A11 So. La Salle, Chicago.

\$40.00 SUITS for \$23.50! All one price. Union made of finest quality Virgin Wool. You don't have to know anything about selling clothing. We guarantee your success if you are honest and willing to work. Write at once. William C. Bartlett, 850 Adams, Dept. 549, Chicago.

DISTRICT Salesman—All wool. Union Made suits, overcoats, \$23.50. Liberal advance commission, bonus. Write for expensive Free outfit. Harvey Bros., Dept. 513, Box 00, Chicago, Ill.

FIFTEEN Dollars a Day. Sell Harrison's "New York Style" suits and overcoats. Tailored 100% virgin wools. Priced \$19.75 to \$34.75. Highest commissions paid daily. Experience unnecessary. Valuable exclusive territory now open. Send for extensive sales portfolio with many selling features. It's free to men who mean business. De Luxe Harrison raincoat line included if you write now. Harrison Bros., Inc., Dept. 566, 135 West 21st St., New York, N. Y.

TO market 3A garage Door Holders. Simple Automatic action; Easy, Quick Installation instantly attracts Private Garage Owners, Builders and Dealers. Write for attractive, exclusive territory proposition. Knowlson-Stevenson Company, 1118 Packard, Ann Arbor, Mich.

DOUBLE Spark Plug—Two spark gaps; Bigger, hotter spark on weaker current and leaner mixture. Guaranteed to be better than other plugs or money refunded. 50% Commission. Agents and side-line men wanted. Affinity Spark Plug Co., Box P329, Omaha, Neb.

SALESMEN—Become Independent. Own Your business, experience unnecessary selling our \$7,500.00 Accidental Death; \$50 Accident; \$25 Sick Weekly Benefits—\$12.50 Yearly. Other Amounts proportionate. Guaranteed steady income from renewals. \$250,000 Deposited Insurance Department. Universal Policy, Dept. A, 30 Clinton St., Newark, N. J.

GUARANTEED Permanent Repair Section for Blown-Out Tires. For Owners and Garages. Big Profits. Small Investment. Freight Paid. Distributors Wanted. Fla. Rubber Products Co., Tampa, Fla.

SELL Stay-Froze Ice Blanket: Saves 10 to 60%. Satisfaction or money refunded; mail \$1 for sample and full particulars. All Florida Chemical Co., Box 255, Lemon City Station, Miami, Fla.

A GUARANTEED salary and commissions selling new specialty among all retailers. Enormous opportunity. New Specialty Corp., Cedar Rapids, Iowa.

OFFICE specialty salesmen wanted. Exclusive agencies. Dibb Manufacturing Company, Minneapolis.

MR. BRUSH Salesmen—Old Established New York brush manufacturers require services of men in all territories to sell their extensive line of Sanitary Twisted in Wire Brushes. We pay larger commission than any other brush house in the country. Write immediately for our proposition. Wire Grip Sanitary Brush Corporation, 15 Mercer St., New York.

\$18 TO \$25 daily. Biggest selling line of 2-piece suits, \$9.95 and \$12.50; 3-piece wool suit, \$17.95 (regular \$28.00 value). All-wool overcoat, \$18.50. Splendid raincoats, slickers and boys' suits. Biggest commissions. Free outfits. "Jim" Foster, Inc., Dept. 29-A, 2250 S. Soanaking Ave., Chicago, Ill.

BIG Season Just Ahead. Advertising pencils most popular every day—every business prospect. Our line repeats. Big commissions. Established in 1902. North American Pencil Works, 126 So. Clinton, Dept. 65-C, Chicago.

MEN—Sell dependable shrubbery, fruit trees, etc. Steady demand. Complete co-operation. Commissions paid weekly. We deliver and collect. Write Perry Nurseries, Dept. R-9, Rochester, N. Y.

SHOES! We specialize in workmen's shoes and furnish equipment free to responsible agents. Write today. J. C. Moench Shoe Company, Boston, Mass.

FILLING Station Salesmen: Convenient sample 25c. Sales Large. Commission Liberal. Midland Printery, Stoughton, Wis.

I WILL Pay You \$2 an Hour to take orders for Carlton dresses and coats. Women in every home, store, factory and office eager to save a third on our stunning Paris styles. Everything supplied Free but only applications stating territory, experience and references will be considered. Carlton, Inc., 206 So. Wabash, Dept. 1053-A, Chicago.

MAKE \$25.00 daily selling colored Raincoats and Slickers; Red, Blue, Green, Etc., \$2.95. Hat Free. Commissions daily. Outfit free. Elliott Bradley, 241 VanBuren, Dept. A19-S, Chicago.

REPRESENTATIVES wanted by over 500 manufacturers, offering real money making propositions. No need of being out of work. Write for Free Copy. Opportunity Magazine, 750 N. Michigan, Service Dept., Desk 1, Chicago.

FOUR \$7.50 sales to merchants net you \$20.00 daily. Savers Systems, 2803 Sheffield Ave., Chicago, Ill.

ANY Salesmen Can Sell Them! Merchants everywhere use punchboards. Someone sells them, why not you? Collect big commissions daily. Newest, largest, elaborate catalog sent upon request. Lincoln Sales Co., 9 So. Clinton, Chicago, Dept. D.

PUNCHBOARD Salesmen, making small towns. One sale a day nets you \$105 weekly. Full commission on repeats. K. & S. Sales Co., 4395 Ravenswood Av., Chicago.

75c PROFIT on \$1.00 sale. Auto, furniture and glass cleaner. Your name on label. Exclusive rights; free sample. Mfg. E. 213 Griswold, Detroit, Mich.

\$60-\$200 A WEEK. Genuine Gold Letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 438-A North Clark, Chicago.

COLLECTS Money from the Dead-Beats. Retail \$5.00—Cost \$1.00—Profit \$4.00. "New Method." Every Storekeeper, Doctor buys quickly. Wonderful Money Getter. Federal Association, Hartford Conn.

DISTRICT Managers: 16 hosiery styles, 10 lingerie styles; over 80 colors. We deliver. \$10.00 sample outfit furnished to representatives (no deposit); 10% bonus. Premium to customer. Advertising and office allowance. Send three references, stating experience, to see Samples Dept. G, S. Q. S., Lexington, Ky.

ATLAS Sign Works for Beautiful Gold Window Letters. Penny Each! Why pay 8c? Write for Free Samples. H1032 E. 55th St., Chicago.

WALKER Made \$165.00 First Day selling Collection System to Doctors and Merchants. Retail \$6.50. Collects \$65.00. Costs \$1.50. Adjustment Bureau, Mobile, Ala.

SALESMEN and Salesladies: Take orders for rugs, damask. Novelty designed bedspreads and draperies. Liberal territory and commission. Rainbow Novelty Mills, Grover, N. C.

SEND name, address on postcard. Free introductory copy Salesology Magazine; contains 1,000 money making opportunities. Offered by big reliable firms; no obligations. Salesology Magazine, Desk B-39, 500 No. Dearborn, Chicago.

TAKE orders for coffee, flour, dried fruits, canned goods, staple groceries, toilet articles, paints, radio sets, auto and tractor oils. No capital or bond required. We deliver and collect. Permanent business. Big pay. Write at once. Hitchcock-Hill Co., Dept. 50, Chicago.

GOLD Leaf window letters and script signs. No experience; 500% profit. Samples free. Consolidated, 69-V West Van Buren, Chicago.

SALESMAN—Get exclusive selling rights of a scientific drugless health product needed in every home. Unlimited possibilities. Write Radiomized Applicator Co., 1303-17 Fillmore, Buffalo, N. Y.

\$20.00 DAILY Selling guaranteed all wool made to measure Suits and Overcoats at \$23.50, regular \$35.00 values. Large and attractive Fall Sample Outfit Free to men with selling ability. Jay Rose & Company, 411 S. Wells Street, Desk 13, Chicago.

HELP WANTED

U. S. GOVERNMENT Jobs. Become Railway Postal Clerks (\$150-\$225 month)—City Carriers—Postoffice Clerks (\$142-\$192 month). Rural Carriers (\$175-\$255 month). Men 18 up. Steady work. Life positions. Paid vacation. Common education sufficient. Sample coaching and full particulars free. Write today sure. Franklin Institute, Dept. N3, Rochester, N. Y.

MEN wanting outdoor work, qualify for forest ranger position. Start \$125 month; cabin and vacation; patrol the forests, protect the game; give tourists information. Write McKane, Dept. M-21, Denver, Colo.

FIREMEN, Brakemen, Baggage-men (white or colored), sleeping car, train porters (colored), \$150-\$250 monthly. Experience unnecessary. 810 Railway Bureau, East St. Louis, Ill.

DO you need more money? Let me add \$30 a week to your pay without interfering with your present occupation. Interesting, pleasant work. Particulars free. Albert Mills, 9450 Monmouth, Cincinnati, Ohio.

MAKE \$25.00 daily selling colored Raincoats and Slickers; Red, Blue, Green, Etc., \$2.95. Hat Free. Commissions daily. Outfit free. Elliott Bradley, 241 VanBuren, Dept. A19-M, Chicago.

LEARN Telegraphy. Pleasant, steady work; big pay. Operators earning \$250 monthly. Always in demand. Previous experience unnecessary. Write chief operator, Illinois Telegraph, 1608 W. Madison, Chicago.

SEND name, address on postcard. Free introductory copy Saleslog Magazine; contains 1,000 money-making opportunities. Offered by big reliable firms; no obligations. Saleslog Magazine, Desk B-49, 500 No. Dearborn, Chicago.

U. S. GOVERNMENT wants men. \$1,700-\$1,900 and up at start. Railway Mail clerk examination coming. Let our expert (former Government examiner) prepare you for this and also Rural Carrier, Post Office, Customs, Internal Revenue, and other branches. Write today for free booklet. Dept. 3, Patterson School, Rochester, N. Y.

BECOME a Landscape Architect. Uncrowded profession of wonderful opportunity for money-making. Easily mastered by mail. Earn while you learn. Write for book. American Landscape School, 56-E, Newark, N. Y.

SILVERING Mirrors, French Plate. Easily learned; immense profits. Plans free. Wear Mirror Works, Excelsior Springs, Mo.

RAILWAY Postal Clerks. Men 18 up. \$1900-\$2700 year. Common education. 25 coached free. Write immediately for particulars. Franklin Institute, Dept. N14, Rochester, N. Y.

MEN, become Forest Rangers: \$125-\$200 mo. and home furnished; permanent, hunt, fish, trap, etc. For details, write Norton, 253 McMan Bldg., Denver, Colo.

CASH Paid for Butterflies, Insects. See Sinclair Display Advertisement on page 30.

ARE You Old at Forty? See our advertisement on page 144 of this issue. The Electro Thermal Company, 2173 Main St., Steubenville, Ohio.

MEN in train for locomotive firemen on railroads nearest their homes—everywhere: businessmen \$150-\$250 monthly; promoted, locomotive engineer, \$3,000-\$4,000 yearly. Best paying positions on railroads. Railway Association, Desk M1, Brooklyn, N. Y.

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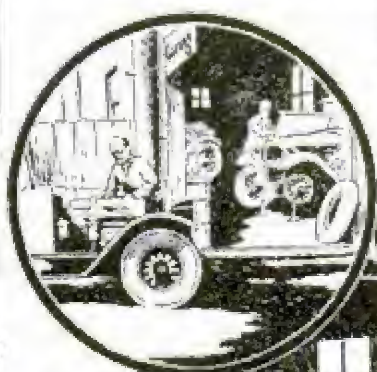
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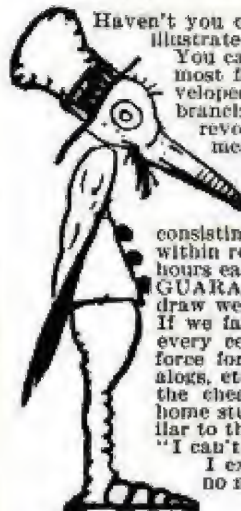
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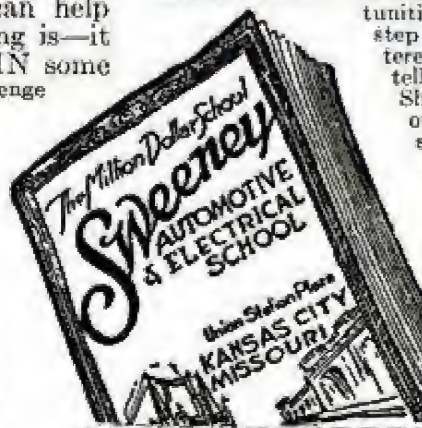
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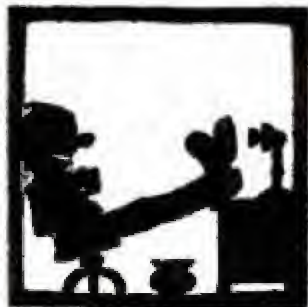
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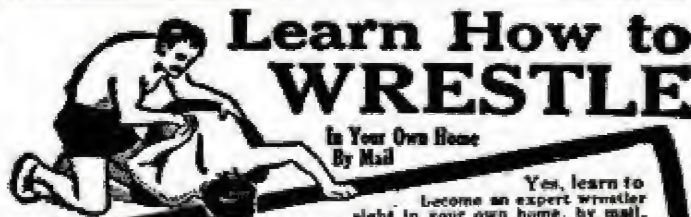
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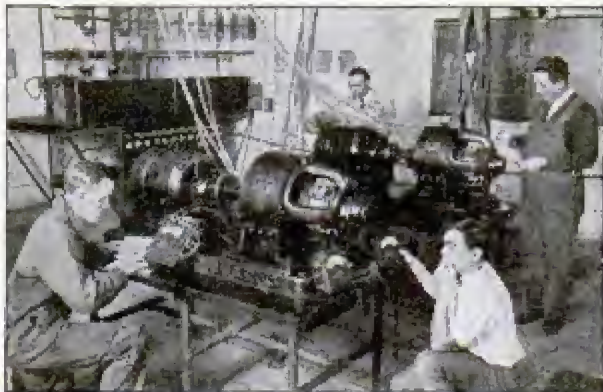
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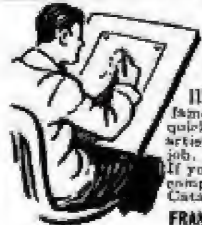


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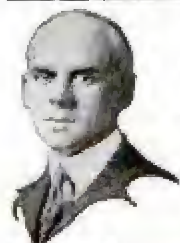
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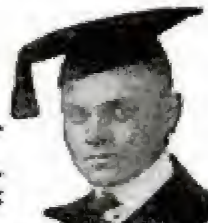
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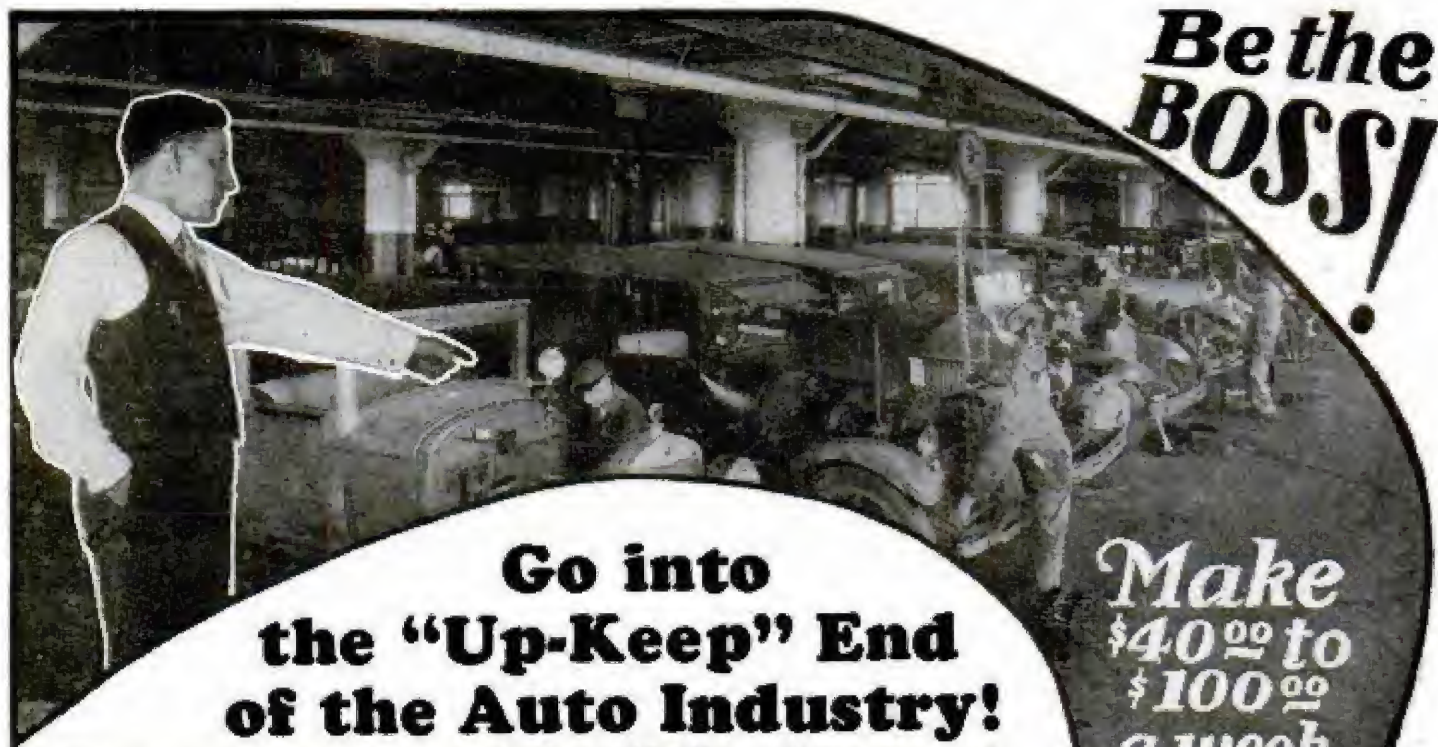
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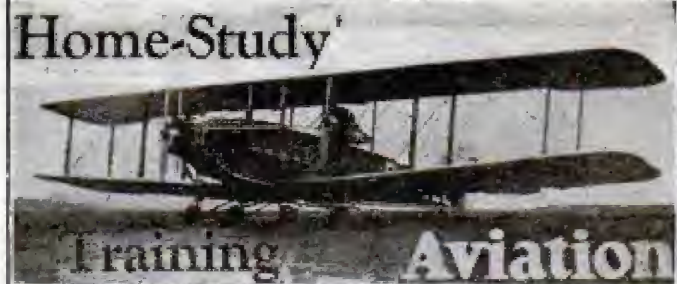
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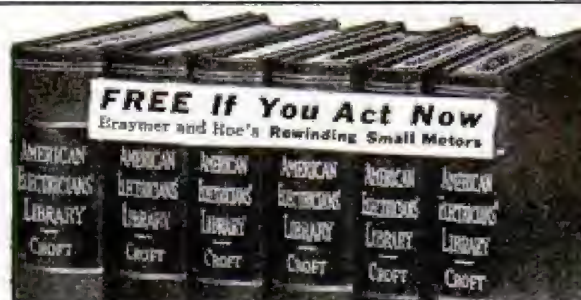
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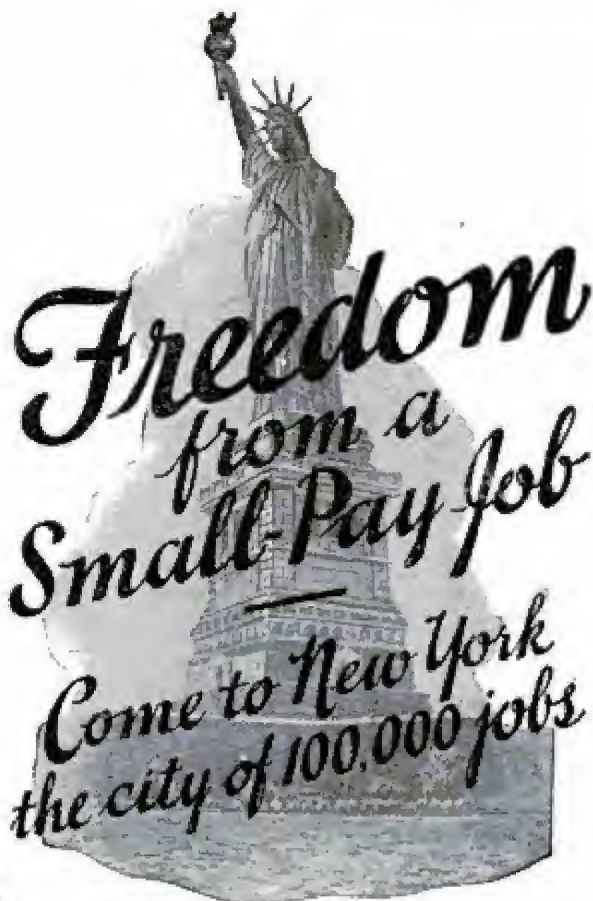
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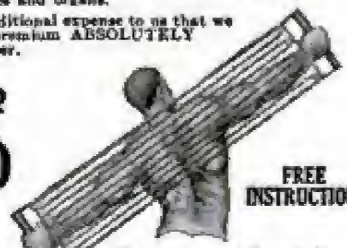
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A German Plan for Utilizing the Concentrated Heat of the Sun to Generate Steam and Operate Turbines Driving Electric Generators; Similar Apparatus Has Met with Some Success

Popular Mechanics Magazine

REGISTERED IN U. S. PATENT OFFICE

WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 48

SEPTEMBER, 1927

No. 3

Age of Wonders Still in Future

Inventor of Automobile Self-Starter Sees Time When
Power Will Be Supplied Directly by the Sun

WILL sun energy supply the power of the future, when coal, water forces and gasoline have been exhausted?

"Why the future?" said Charles F. Kettering, inventor of the self-starter for automobiles and many other things that have advanced the science of motoring. "Isn't sun power our main power today?" he asked. "We are but using up the energy the sun stored away for us during countless centuries prior to the time when man first learned the uses of steam and gasoline."

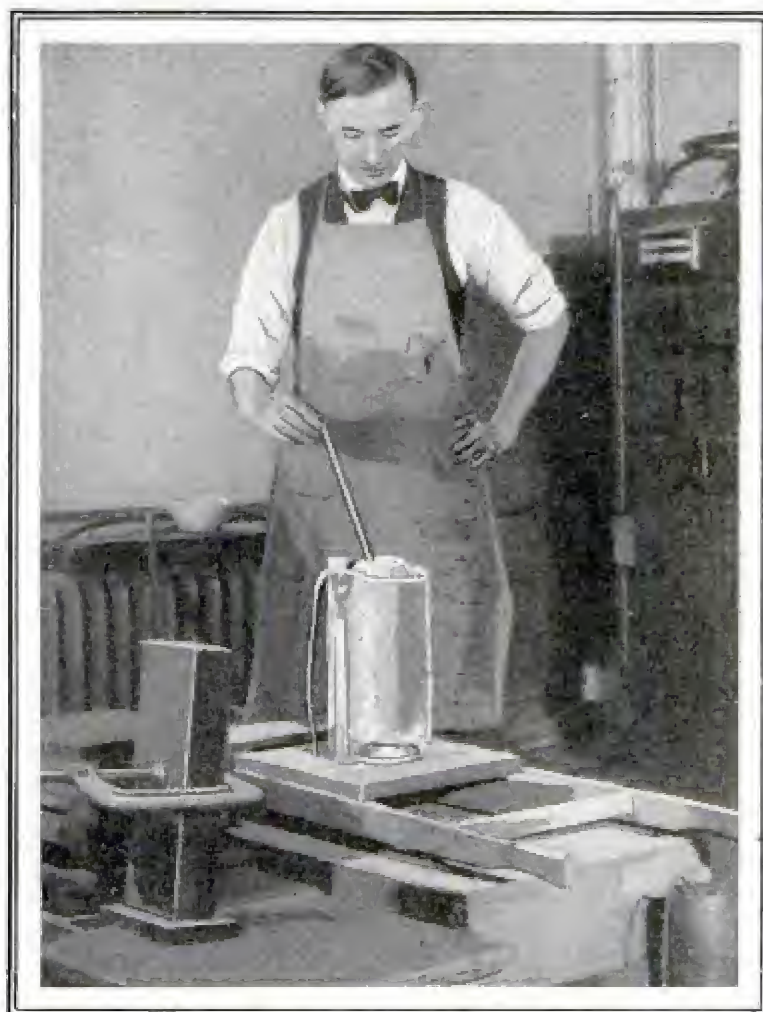
"The time will come, however, when we must use the sun power given us every day. The world will use more and more power, and gradually our natural resources will give out. Not in our lifetime, certainly, but, geologically speaking, just a short time ahead. Then we must turn to the sun and to the spots on earth where the sun is most active."

Mr. Kettering

says the world is interested generally in sun machines that are being invented with a certain degree of success, but he doesn't believe a sun machine in itself will be the method to be adopted for the use of sun energy. Coal fields, he points out, came as the result of vegetation brought forth by sun power.

"A learned scientist is now experimenting in Cuba, where it is possible to raise eleven tons of sugar to the acre," he said. "In these temperate zones we may do our own experimenting—that of making fuel from vegetation—but the method is too slow for this swiftly moving world. We must plant our corn in the spring, wait for the sun to develop it to maturity and harvest it in the fall—all before we are ready to make commercial use of what the sun has accomplished."

"Now, in the tropics, this process is shortened by months."



The Small Electric Furnace with Which Mr. Kettering Demonstrates How to Fry an Egg in a Skillet Set on a Cake of Ice

General Director General Motors
Research Laboratories

2667
Cont. E. O. McLaughlin. Feature depth. Detroit News, Detroit, Mich.

And so, when the time comes for us to turn our eyes toward the sun, we must take to the tropics." Visions of the world of tomorrow have been painted by other scientists, following the success of sun-power machines, operated during the sunlight hours by means of great lenses to generate steam. Predictions have been made that the generations that will follow a gasless and coalless age, will people the great deserts. But the engineer, who made it possible to start an automobile without cranking and who heads one of the greatest research laboratories in the world, asks why bother with engines at all, when the sun is at work constantly to produce man's greatest necessity—fuel.

"Who knows but that the time may come," he suggested, "when man will learn to use directly the sun power; that, instead of waiting for the sun to place its energy into a grain of corn which man can remove in the shape of alcohol, such energy may not be put to work at once as a slave to the ingenuity of man?"

In stressing the importance of fuel, Mr. Kettering emphasizes that mankind is merely taking its first toddling steps in science and cites the case of J. W. Mettler, of Great Falls, Mont., who in 1888 received a suit and overcoat for dumping 20,000 barrels of gasoline into a creek and not getting caught at it. Gasoline was the white elephant to the refiner, for, when

too much of it was left in kerosene, lamps exploded. He gladly paid anyone to get rid of the dangerous stuff. Today, as Mr. Kettering says, more than one-half of the horsepower produced in the United States is developed by gasoline.

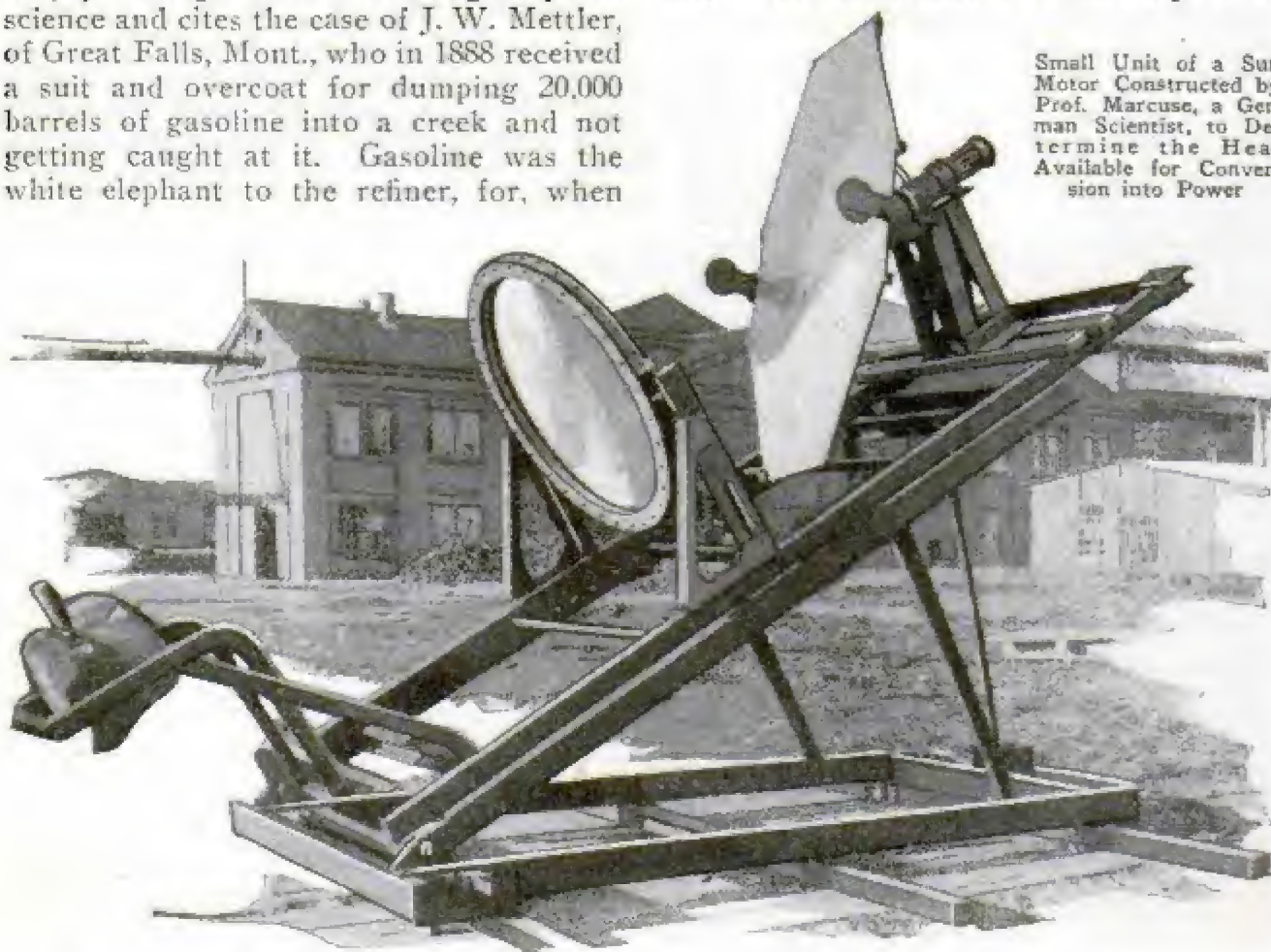
"When our crude oil is gone, we must learn how to cause the sun to make us more, not in the process that requires ages, but quickly," he says.

Mr. Kettering believes the greatest danger in the world today is the belief generally held that this is a wonderful age.

"When man first learned to fashion knives and hatchets of flint, he thought that he lived in a wonderful age," he illustrated. "Next, when a smarter generation fashioned their implements of bronze, they too considered themselves wonderful, and so on through the ages. Now we have automobiles, radio, steam engines, airplanes and radium and we go around boasting about our wonderful age. But we are just learning to walk!"

Mr. Kettering often lectures in his laboratory and loves to illustrate. His favorite is the small electric furnace in his laboratory. "In the furnace we'll take a piece of

Small Unit of a Sun Motor Constructed by Prof. Marcuse, a German Scientist, to Determine the Heat Available for Conversion into Power



iron bar and heat it red-hot," he said. "Over the furnace, while the iron is red-hot, we'll place this piece of ice and notice that it doesn't melt. On top of the ice we'll put this skillet and in it drop an egg. You notice the egg fries, while the ice does not melt.

"That is all very simple, because all we have is a transformer that sends out electric radiations. When we place in the furnace a piece of metal, these radiations induce electric currents in the metal which make it hot. We all know that electric currents will not flow into ice, so the ice does not get hot. We get all our heat from the sun, whose rays pass through space that is absolute zero, and it is only when they strike something that they are converted into heat. The heat was generated in the bar but not in the ice."

Gasoline, as the important fuel, says the engineer, is being made better today than ever before and yet, he affirms, scientists have just taken their first steps in getting all the power out of gasoline.

"The world must accept new things or die," he declared. "We all know that every civilized country that became satisfied with its old things, passed away. We must quit saying we are living in a wonderful age, for the wonderful age is yet to come."

BALLOONS IN BATHING SUITS SERVE AS LIFE PRESERVERS

Weighing but two ounces, and tied to the shoulder strap of the swimming suit, a life preserver devised by a Los Angeles man consists of three balloons that may be used for play when not needed as supports. They are inflated by a tiny gas bomb which is broken by simply squeezing two small handlelike pieces of steel with prongs which puncture the gas container and allow the gas to escape into the balloons. The preserver will support a 250-pound man for from three to six hours.



Balloons on Suit and One Broken Open to Show the Inner Holder That Contains Inflating Gas

POCKET ARC LAMP FOR PHOTOS SUBSTITUTE FOR FLASH



Using the Arc Light to Take a Picture, and Close View of Its Construction and Connections

For taking interior photographs, a German concern has introduced a pocket-size electric arc light that closes flat like a cigaret case, when not in use, and is about the size of an ordinary wallet. It is designed for all types of current and is a substitute for flashlight powder, with its noise, smoke and the scared looks it often produces on the faces of the subjects. It is said to be suitable for large groups when a time exposure is given. In such a case the group is "painted" with light by moving the arc about over the field to kill the shadows. The lamp may either be attached to the camera tripod or it can be held in the hand without danger.

H. Traub, 36 Brennerstrasse, Munich, Germany.

Maher, Safety & Lost Products Co., Allied Crafts Bldg., Los Angeles, Calif.

Ans. Eyre Powell

913 Chamber of Commerce Bldg., Calif.

SEAGOING TRICYCLE HAS SPEED OF TEN MILES AN HOUR

When he wants an ocean ride, a New York inventor is independent of boats, for

Motor Tricycle That Rides the Ocean Waves; Securely Balanced on Three Floats, the Rig Can Make Ten Miles an Hour, under Favorable Conditions



he pedals out on his seagoing tricycle. It is sturdily constructed and well balanced on floats. At the time the accompanying photograph was taken, the rider was making about ten miles an hour without great effort off Atlantic City, N. J.

RUBBER IS REPLACING METAL IN MANY FIELDS

Rubber is proving a durable substitute for iron, steel and other metals in various industrial processes. One of its increasing uses is in linings for grinding mills. In a cement plant where one-inch rubber sheets were used in a mill charged with 45,000 pounds of steel balls, not even the cloth on the rubber's surface had been worn off after ninety days' use, and the rubber was not worn more than one sixty-fourth of an inch after fourteen months of service. One explanation of this is that rubber absorbs the impact. In various ceramic processes, rubber is preferred to metal for linings, as it reduces the risk of contaminating the product, is more easily cleaned and in certain chemical processes, insures

protection against erosion. Rubber linings have also been used successfully in flues built to carry off abrasive dust and gases. A rubber sheet on a river dredge was found to outlast ten steel plates. It was placed at the mouth of the discharge conveyor, to receive the impact of rock and sand. Rubber bearings on a power tug showed no visible signs of wear after ten months' service, and speeds of 5,000 revolutions per minute have been attained with bearings of this kind, without any difficulties. Grit and sand injure the material less than they do metal, for the particles imbed themselves in the rubber and gradually work out through the grooves in bearings where they are washed away by water, the only lubricant needed. Reduction of vibrations

and noises commends the use of rubber bearings in passenger craft.

ROLLER PRESS FOR FENDERS 1584 IRONS OUT BUMPS

To simplify the task of straightening bent automobile fenders, an efficient roller press has been designed. It literally "irons out" the dents and can be adjusted to many angles and positions according to the requirements of the job.



Two Views of the Fender Press, Showing How the Rollers Can Be Adjusted to Iron Out Dents

*Long Beach, Calif.
St. Louis, Mo.
City Fender Works, 626 E. Fourth St.*

*New York Times
28 27
127*

*Patterson Laundry
Machinery Co.*

*City Fender Works
626 E. Fourth St.*

WHITE HOUSE LOSES ITS CENTURY-OLD COVERING



© Harris & Ewing

Building a Temporary Roof over the White House to Protect It While the Real Roof Is Being Laid, and, Insert, the Famous Executive Avenue Gates, Which Are Being Removed

The roof that has sheltered the presidents of the United States for more than a century has finally given way for more modern construction. The ancient wooden trusses that spanned the building from wall to wall have come out, and on 200 tons of new steel beams a new roof has been laid. A bill for \$300,000 for a new roof looks large, but the changes made required the rebuilding of the entire attic floor and the reconstruction of some of the massive brick chimneys down to the second floor. To protect the valuable furnishings from inclement weather, it also was necessary to cover the entire White House with an elaborate false roof, raised high enough to permit construction being carried on under its shelter. At the same time another improvement was started with the removal of the historic old gates of West Executive avenue, the narrow street between the

White House offices and the old State, War and Navy building. The gates were erected between 1872 and 1875, during President Grant's term.

FIRST TURBINE SHIP CUT IN TWO

The "Turbinia," a 100-foot steamer that astonished the world thirty years ago with its speed of more than thirty-two knots by turbine drive, has been cut in two and sent to the South Kensington museum to be housed among other notable exhibits. It was this ship, the invention of Sir Charles Parsons, that paved the way for the modern ocean greyhounds and their speedy schedules. Since quarters large enough to accommodate the entire vessel could not be found in the museum, the "Turbinia" was cut in half. The after part has been placed on exhibition.

Owner - Mess. Parsons & Co. Turbine Co. Ltd.

Shipping World 6/22/27

University of Chicago

HOW MOUNTAINS WERE MADE SHOWN BY MODELS



Dr. Link Applying Lateral Pressure to Model Mountains in Laboratory, to Illustrate How Appalachians Were Probably Formed; Right, Sawing a Block for Better Examination of the Strata



Pointing to Dark Layer of Grease, Which Represents a Lava Flow



One of the Best Specimens, Showing the Folding and Slipping That Often Occurs to Form Ridges; Arrows on White Block Show How the Pressure Was Applied

Grease as Lava, Forced between Layers of Concrete and Plaster, to Illustrate Ridge Formation



Surrounding Material Cleared Away, to Reveal How Lava, in This Case Represented by Grease, Spreads in Being Forced into Rock

ROCKIES WERE MADE BY PUSH FROM THE WEST 2953

By making miniature mountains, bending and squeezing them with jack screws, Dr. Theodore A. Link, of the University of Chicago, has given interesting laboratory demonstrations of the possible manner in which the Rockies and other ranges were formed. His general method is to use wet layers of sand mixed with cementing material, such as plaster of paris, and alternate layers of wax, grease, paraffin and other substances, to represent the different strata. The mass is placed in a pressure box and subjected to the action of the screws from various angles. By regulating the pressure, its speed and the period of application, different effects are obtained. The "mountains" can be cut open to study the folds, faults and other features of the strata. Similar experiments were made to show how volcanoes operate. Hot paraffin, representing lava, was forced into and through artificial rocks by upward pressure of the jacks. Dr. Link suggests that the Rocky mountains were formed by a severe push of the earth's surface from the west and that the great American desert is evidence of a vast inland sea which formed when the upward fold of the world's crust imprisoned part of the ocean and in the course of time has dried up.

AUTO-RIM REMOVER SIMPLIFIES PUNCTURE REPAIRS 2586

Punctures have less terror for the motorist equipped with a recently introduced

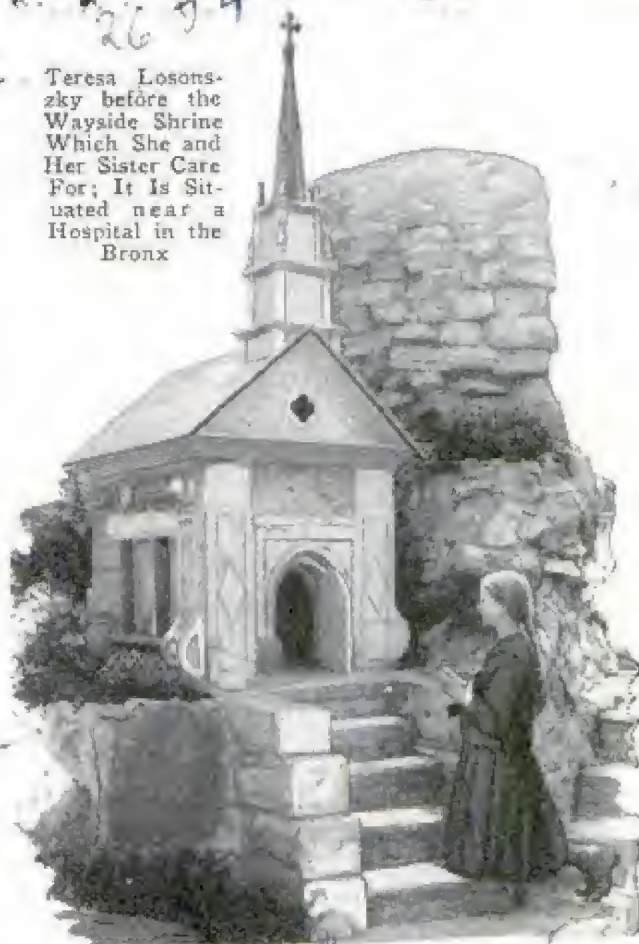
lever unit for removing the tire rim and replacing it. The task requires but a few minutes, with this aid, and is easily performed. The lever operates on a ratchet gear, essentially like a jack, is quickly clamped on and



"breaks" the rim apart at the joint so that it can be removed. To put it back, the lever is used in a reverse way.

Douglas Rim Tool Co.
Attn: Mr. T. J. Sharpe

2694
Teresa Losonsky before the Wayside Shrine Which She and Her Sister Care For; It Is Situated near a Hospital in the Bronx



MINIATURE CHURCH AND SHRINE ON CITY STREET

Persons passing St. Joseph's hospital for consumptives at 143rd street and St. Anne's avenue, the Bronx, come unexpectedly upon a little wayside shrine, built on a terrace of the institution's grounds. A miniature church, realistic in detail, has been constructed, and the shrine, which has become known as one of the novel beauty spots of that part of the city, is in the care of two young girls.

IMPROVED PLANTER SAVES SEED AND INCREASES CROPS 2842

Marked savings in the quantity of seed required and increased yields, varying from 100 to 200 per cent, are claimed for a planter an Austrian has devised for use with small crops. An important feature is that seeds are placed at exact intervals which can be carefully regulated according to the kind. It is reported that grains and other produce sown with this outfit sprouted two to three weeks earlier than those planted with ordinary rigs or by hand, were deeper green, longer, and that the stalks were of greater diameter.

name unknown.
Reported by John P.

consult all Vienna
Repet of Commerce

Proof against Warp-
ing; the Metal Guitar
and Its Inventor



ALL-METAL GUITAR PRODUCES LOUD, SWEET TONE

Besides being proof against warping and checking, an all-metal guitar devised by a Los Angeles inventor is said to possess great volume, making it adaptable to more efficient use in an orchestra, and yet maintains the sweet tone of the wooden instrument. German silver was the material used in manufacturing the guitar shown in the accompanying illustration.

WATER SUPPLY IS KEPT PURE BY RAIN AND DROUGHT

Periods of rainy weather, then days of drought may be unpleasant to all and particularly annoying to the farmer, but it is this alternating wet and dry weather that keeps the great supply of well water pure, insuring the health of millions and preventing the spread of harmful microbes. This hitherto unrealized law of nature, the rise and fall of ground water due to rain and drought, giving the soil a chance to filter out the impurities, has recently been revealed as the result of investigations in water pollution. Foreign material sinks with the water as it passes into the earth and will not flow far to the sides until a large area of moist ground is encountered. Then it tends to spread out over a wider

territory in a lateral direction. If a constant rainfall kept this moist section at a permanent level, harmful substances would thus travel much farther and might easily trickle into wells and springs. But as the wet strata keep moving up and down, due to the rainy and dry spells, a continual filtering process is going on, keeping the great ground supply of water pure. During tests at army camps, it was found that chemical pollution in water traveled as much as 450 feet and bacterial impurities over 200 feet from the trenches in which they were placed.

PORTABLE AUTO OIL CLEANER 2442 SUBSTITUTE FOR PIT

One of the latest units for servicing automobiles is a portable motor outfit to clean the oil. It insures a thoroughly flushed crankcase, prevents pollution of new oil and eliminates the use of the pit for draining. In operation, it pumps a cleaning lubricant through the running motor at the oil intake into a pan underneath the engine. Then the oil is filtered and pumped back again. The process is continued until the lubricant clears up in color. The refiltered cleaning lubricant is pumped through the motor at the rate

Filtering the Auto Oil
with Portable Unit
That Eliminates Need
of Pit



of ten gallons a minute. With this apparatus, oil in the entire system is given a thorough washing.

U.S. Pat. # 1,632,282

¶ We want all our readers to write us freely and often whenever they wish additional information on articles published in this magazine. Address Bureau of Information, Popular Mechanics, Chicago.

Can. 271,272

Patent application

Pat. 1,632,282

Public Health

Los Angeles, Calif.
Pan. American Petroleum Co., 1851 E. Washington St.
Los Angeles, Calif.

6/29/29

AIRSHIP TO CARRY FIVE PLANES

2851

an Dreams of a dreadnaught of the skies are promised realization in a monster dirigible planned for the United States navy. It will be two and one-half times as large as the "Los Angeles" in volume, will carry five airplanes that can be launched, while the ship is in motion, down inclined runways within the bag, a battery of guns, and will have a cruising radius equivalent to nearly half the distance around the world at a speed of about sixty miles when filled with non-inflammable helium. Round-trip flights from New York to Honolulu or two round-trip voyages to Europe on one fueling would thus be possible. The maximum speed will be approximately eighty miles an hour. A crew of forty-five men and officers will be carried. The bag will have a gas capacity of 6,500,000 cubic feet. Construction of the ship is authorized by action of congress. The Goodyear Rubber company won first prize for its plans for such a dirigible.



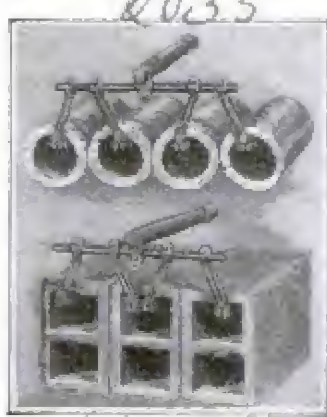
Lofty "Tripod" for Motion-Picture Camera in Filming Outdoor Scenes; the Ladder and Platform Built on Tall Fir Tree

MOVIE IS FILMED FROM TREE THAT SERVES AS TRIPOD

A "tripod" more than 100 feet high was used in taking an outdoor motion picture recently. It was a tall fir tree to which a ladder and platform were attached so that a wide view could be obtained.

CARRIER FOR HANDLING TILE REDUCES BREAKAGE

Adaptable to building or drain tile of different sizes, a hand carrier speeds work and reduces the risk of breakage. It is adjusted for rapid picking up, holds the pieces securely and is well balanced.



SILK FROM REDWOOD BARK

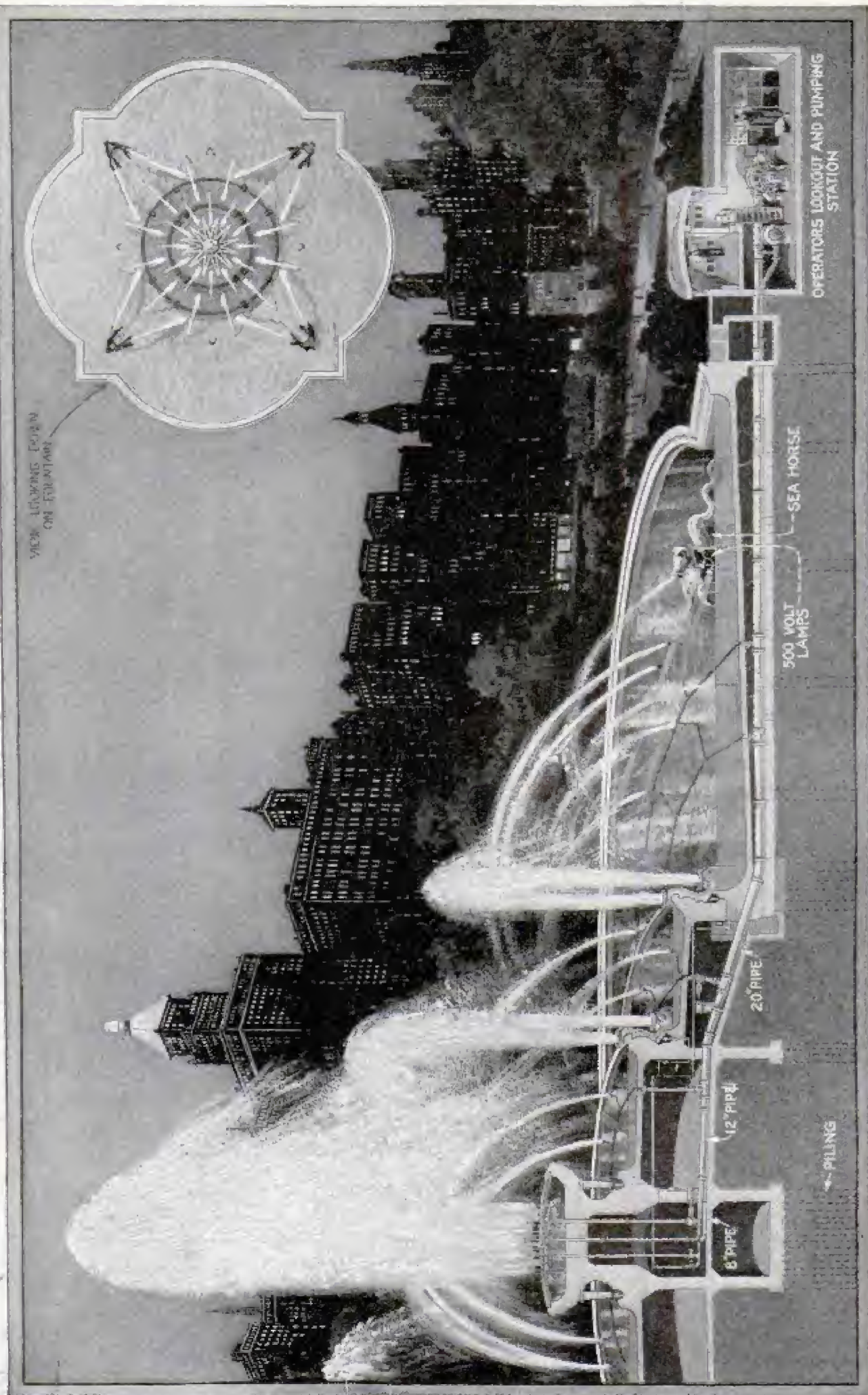
Artificial silk, suitable for the manufacture of stockings and other articles, is now being made from the bark of giant redwood trees. The discovery of the process makes it possible to utilize practically every fiber of the tree, the bark alone being considered a waste product until the silk-producing method was developed. Other trees have furnished material for artificial silk, but not the redwood.

Smith
Beacon
Los Angeles, Calif.

The Builders Material Co.,
Cedar Rapids, Iowa.

The Patent
Richard B. Arthurs
Leather Kid, Camp Lewis, Tacoma, Wash.

Muller Tile Carrier



Against the Background of Towering Skyscrapers with Their Myriad Lights, Glistening Columns of Spray Are Thrown More Than 100 Feet in the Air, Lit by Concealed and Ever-Changing Lights in Chicago's New Memorial Fountain



A Night Photograph of the Buckingham Fountain at the First Test of the Pumps; the Pyramid of Light in the Background Is the Tower of a Michigan Boulevard Office Building

Colored Lights Reveal Fountain's Beauty

Play of Water and Colors in Giant Memorial Basin Outshines Historic Pageant Created by French Monarch Long Ago

A FOUNTAIN that has cost more than \$600,000, and that is to be supported by a perpetual endowment fund of \$200,000 more, has recently been completed in Chicago and hailed by artists and architects as the greatest feat of hydraulic architecture in history. It is conceived on so vast a scale that it outshines the historic fountains of Versailles, which draw tourists from all parts of the world.

The new fountain, a memorial to Lieut. Clarence Buckingham, who lost his life in France, was given to the city by his sister, and erected in Grant park, opposite the famous skyscraper-lined Michigan boulevard. Into a basin, 300 feet across, a myriad water jets, some rising 110 feet into the air, pour ten and a half million gallons daily, when the fountain is operating at full capacity. Clusters and rows of electric lights, hidden beneath the water, shine through the clouds of spray, while an operator in a

concealed control plant plays a giant switchboard, resembling a mammoth pipe-organ console, to produce the continuous changes in the water display and the color of the lights.

Hundreds of tons of concrete and marble, a forest of enormous wooden piling, and eight huge bronze sea horses, besides miles of electric wiring and a prodigious amount of big water mains, went into the construction. Nine hundred piles, each seventy-five feet long, were driven down to bedrock to carry the weight. They are topped by concrete columns, which in turn carry the entire weight of the fountain, cast as a monolith, 300 feet across, and faced with pink Georgia marble. The reinforced-concrete monolith was poured on a bed of loose cinders, so that the bed would settle and leave the fountain suspended on the piling stilts, permitting the earth to expand and contract with alter-

2711
nate freezing and thawing, without damaging the superstructure.

The combination of concrete and Georgia marble, having different rates of expansion and contraction in heat and cold, added to the difficulty of water seepage getting between them, made the fountain construction an unusual problem. Elastic joints and expansion chambers had to be provided, so that the hundreds of tons of marble could move over the concrete, while water seepage drained through a myriad of concealed ducts.

The top of the fountain is made of four huge blocks of marble, each weighing eighty-four tons. The largest stone ever quarried, it is claimed, was the eighty-six-ton block for the statue of Civic Virtue in New York, so each of these four comes within two tons of the record. The four blocks were so big that it was necessary to cut them down practically to a finished size on the quarry bed. Enormous ramps, like those used in the construction of the pyramids, were built up, and on these modern tractors hauled the stones to the surface, for final polishing and finishing. Four special steel flat cars brought the

blocks from the quarry to Chicago, and other ramps were built to unload and convey them to the fountain.

The interior of the fountain is a hollow chamber, criss-crossed by big water mains and insulated electric ducts which lead in a network from the control and pumping house to the fountain. All the water valves are shut and opened electrically, so the operator can play the streams of water at the pressure of a button. Series of 500-watt lamps, backed by chromium-plated reflectors, shine through the larger jets, while a hidden recess under the superstructure is lined with rows of 100-watt globes in water-tight containers.

Eight enormous sea horses of bronze, cast in France at a cost of \$100,000, play in the big water basin. The control and pumping station is practically all underground, save for a long and narrow window facing the fountain, from which the operator watches the display. Shrubbery will conceal the window from visitors.

The water in the fountain is used over and over again, only enough being pumped from near-by Lake Michigan to take care of evaporation.



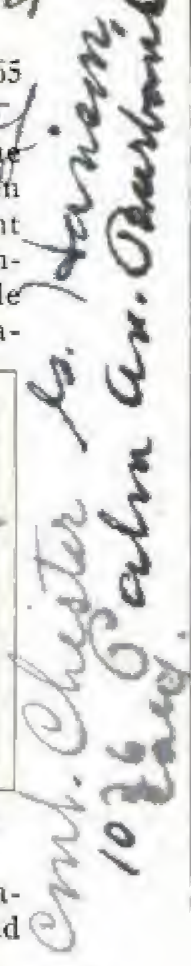
Below, One of the Many Groups of Spray Nozzles



Eight Huge Sea Horses of Bronze, Like the Models at the Left, and a Central Group, Below, Furnish Ornament; the Huge Bronze Pieces Were Cast in France and Cost \$100,000



may easily be encountered elsewhere. The cup produces from twelve to sixteen ounces of water per day while only eight ounces are necessary for life. The construction of the device is said to enable any one to breathe through it without fa-



tigue and it is made of non-corrosive material. Col. Charles A. Lindbergh and others have carried them on their trips.

To help pupils in learning to play the piano, a light system has been introduced in New York. The instructor guides the beginner from an adjacent piano which causes lights to flash over the keys at the pupil's instrument as the teacher strikes the proper notes. The plan is said to develop the capacity for reading music rapidly and correctly.

As Instructor Plays, Lights Appear above the Keys on the Student's Piano, Aiding Correct Fingering and Reading of Notes

International Life Saving Water Making
Cup. Corp. 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047 2048 2049 2050 2051 2052 2053 2054 2055 2056 2057 2058 2059 2060 2061 2062 2063 2064 2065 2066 2067 2068 2069 2070 2071 2072 2073 2074 2075 2076 2077 2078 2079 2080 2081 2082 2083 2084 2085 2086 2087 2088 2089 2090 2091 2092 2093 2094 2095 2096 2097 2098 2099 2100 2101 2102 2103 2104 2105 2106 2107 2108 2109 2110 2111 2112 2113 2114 2115 2116 2117 2118 2119 2120 2121 2122 2123 2124 2125 2126 2127 2128 2129 2130 2131 2132 2133 2134 2135 2136 2137 2138 2139 2140 2141 2142 2143 2144 2145 2146 2147 2148 2149 2150 2151 2152 2153 2154 2155 2156 2157 2158 2159 2160 2161 2162 2163 2164 2165 2166 2167 2168 2169 2170 2171 2172 2173 2174 2175 2176 2177 2178 2179 2180 2181 2182 2183 2184 2185 2186 2187 2188 2189 2190 2191 2192 2193 2194 2195 2196 2197 2198 2199 2200 2201 2202 2203 2204 2205 2206 2207 2208 2209 2210 2211 2212 2213 2214 2215 2216 2217 2218 2219 2220 2221 2222 2223 2224 2225 2226 2227 2228 2229 2230 2231 2232 2233 2234 2235 2236 2237 2238 2239 2240 2241 2242 2243 2244 2245 2246 2247 2248 2249 2250 2251 2252 2253 2254 2255 2256 2257 2258 2259 2260 2261 2262 2263 2264 2265 2266 2267 2268 2269 2270 2271 2272 2273 2274 2275 2276 2277 2278 2279 2280 2281 2282 2283 2284 2285 2286 2287 2288 2289 2290 2291 2292 2293 2294 2295 2296 2297 2298 2299 2300 2301 2302 2303 2304 2305 2306 2307 2308 2309 2310 2311 2312 2313 2314 2315 2316 2317 2318 2319 2320 2321 2322 2323 2324 2325 2326 2327 2328 2329 2330 2331 2332 2333 2334 2335 2336 2337 2338 2339 2340 2341 2342 2343 2344 2345 2346 2347 2348 2349 2350 2351 2352 2353 2354 2355 2356 2357 2358 2359 2360 2361 2362 2363 2364 2365 2366 2367 2368 2369 2370 2371 2372 2373 2374 2375 2376 2377 2378 2379 2380 2381 2382 2383 2384 2385 2386 2387 2388 2389 2390 2391 2392 2393 2394 2395 2396 2397 2398 2399 2400 2401 2402 2403 2404 2405 2406 2407 2408 2409 2410 2411 2412 2413 2414 2415 2416 2417 2418 2419 2420 2421 2422 2423 2424 2425 2426 2427 2428 2429 2430 2431 2432 2433 2434 2435 2436 2437 2438 2439 2440 2441 2442 2443 2444 2445 2446 2447 2448 2449 2450 2451 2452 2453 2454 2455 2456 2457 2458 2459 2460 2461 2462 2463 2464 2465 2466 2467 2468 2469 2470 2471 2472 2473 2474 2475 2476 2477 2478 2479 2480 2481 2482 2483 2484 2485 2486 2487 2488 2489 2490 2491 2492 2493 2494 2495 2496 2497 2498 2499 2500 2501 2502 2503 2504 2505 2506 2507 2508 2509 2510 2511 2512 2513 2514 2515 2516 2517 2518 2519 2520 2521 2522 2523 2524 2525 2526 2527 2528 2529 2530 2531 2532 2533 2534 2535 2536 2537 2538 2539 2540 2541 2542 2543 2544 2545 2546 2547 2548 2549 2550 2551 2552 2553 2554 2555 2556 2557 2558 2559 2560 2561 2562 2563 2564 2565 2566 2567 2568 2569 2570 2571 2572 2573 2574 2575 2576 2577 2578 2579 2580 2581 2582 2583 2584 2585 2586 2587 2588 2589 2590 2591 2592 2593 2594 2595 2596 2597 2598 2599 2600 2601 2602 2603 2604 2605 2606 2607 2608 2609 2610 2611 2612 2613 2614 2615 2616 2617 2618 2619 2620 2621 2622 2623 2624 2625 2626 2627 2628 2629 2630 2631 2632 2633 2634 2635 2636 2637 2638 2639 2640 2641 2642 2643 2644 2645 2646 2647 2648 2649 2650 2651 2652 2653 2654 2655 2656 2657 2658 2659 2660 2661 2662 2663 2664 2665 2666 2667 2668 2669 2670 2671 2672 2673 2674 2675 2676 2677 2678 2679 2680 2681 2682 2683 2684 2685 2686 2687 2688 2689 2690 2691 2692 2693 2694 2695 2696 2697 2698 2699 2700 2701 2702 2703 2704 2705 2706 2707 2708 2709 2710 2711 2712 2713 2714 2715 2716 2717 2718 2719 2720 2721 2722 2723 2724 2725 2726 2727 2728 2729 2730 2731 2732 2733 2734 2735 2736 2737 2738 2739 2740 2741 2742 2743 2744 2745 2746 2747 2748 2749 2750 2751 2752 2753 2754 2755 2756 2757 2758 2759 2760 2761 2762 2763 2764 2765 2766 2767 2768 2769 2770 2771 2772 2773 2774 2775 2776 2777 2778 2779 2780 2781 2782 2783 2784 2785 2786 2787 2788 2789 2790 2791 2792 2793 2794 2795 2796 2797 2798 2799 2800 2801 2802 2803 2804 2805 2806 2807 2808 2809 2810 2811 2812 2813 2814 2815 2816 2817 2818 2819 2820 2821 2822 2823 2824 2825 2826 2827 2828 2829 2



Plaster and Wallpaper in This Room Were Removed Intact from House in Maine and Installed in New Dwelling in Massachusetts

RARE OLD WALLPAPER MOVED ON PLASTER TO NEW HOUSE

Removal of the plaster, with its imported wallpaper, from a dwelling in Maine, and its replacement in rooms of the same dimensions in a house in Massachusetts, were accomplished recently. A special facing was used to prevent the paper from tearing while the plaster was carefully cut away. With the woodwork, the wall decorations are valued at \$4,000. The paper was put on in 1804. It was brought from Italy and depicts views of the Vatican and other Italian scenes.

NEW YORK-CHICAGO AIRPLANE EXPRESS TO SAVE A DAY

Day and night air-express service between New York and Chicago and Chicago and Dallas will be inaugurated by the American Railway express in conjunction with the National Air Transport, Inc., on or about the first of September, saving a

business day on package shipments between the points named and speeding them to other intermediate points and to cities which make a close connection with the air line by rail. Between New York and Chicago, the only intermediate stopping place will be Cleveland, Ohio, and between Dallas and Chicago, stops will be made at Fort Worth, Oklahoma City, Ponca City, Wichita, Kansas City, St. Joseph, Davenport, Rock Island and Moline. Two trips will be made each way daily, between New York and Chicago. Packages leaving New York at 8:00 o'clock at night will reach Chicago at 5:35 the next morning. East-bound planes leaving Chicago at 8:00 a. m. will get their load into the Pennsylvania station at New York at 7:00 in the evening.

The New York landing field will be at New Brunswick, N. J. Flying equipment for the service will include eighteen Douglas planes, seven Curtiss "Carrier Pigeons" and eight "Travel Air" monoplanes. The Douglas and Curtiss planes are powered with 400-horsepower Liberty motors. The monoplanes will have Wright "Whirlwind" 200-horsepower air-cooled motors of the same type used in the recent transatlantic flights. The planes will carry from 750 to 1,000 pounds pay load. In addition to express, air mail will be carried between these points by the National Air Transport under contract with the post office department. Since May, 1926, the company has flown about 1,000,000 miles between Dallas and Chicago without injury to any of its personnel or the loss of a letter or package.

By filtering the water in which workers wash their hands, a Kansas City jewelry company reclaims about \$3,000 in precious metals yearly.

506 S. Wabash
Chicago

KEROSENE AS LOBSTER BAIT INCREASES CATCH 2836

Bricks soaked in kerosene and placed in the lobster traps have proved successful as bait for shellfish along the Maine coast. Fishermen are employing it instead of other smelly lures as the bricks keep their odor for several days, are easy to handle, and a gallon of oil will treat a number of bricks. Brick-baited traps contained more lobsters than those using mixed fish.

SEEK TO SPEED TREE GROWTH FOR PAPER MAKING 2469

Greater speed in the growth of poplar trees for pulpwood is the object of experimental work recently conducted by the New York botanical garden, Columbia university and a paper-manufacturing company. The work is based on selective breeding of seeds in order to isolate the strains possessing unusual merit. The seeds selected are those growing high up in trees. The female catkins are inclosed in paper bags before the flowers are ready for pollination. Those in close touch with the work state that many of the hybrids that have been obtained are showing growth of an inch a year, indicating that trees may be harvested when not much more than ten years old. A Carolina poplar, thus bred, has reached a height of ten feet one inch in its third summer.



Selecting Tree Seeds for Faster Growth and So Speeding Paper Making; Inclosing Female Catkins in Paper Bags

Father of the Saxophone? The "Serpent" of the Old-Time Bands



"SERPENT" OF OLD-TIME BANDS PRODUCES SWEET MUSIC

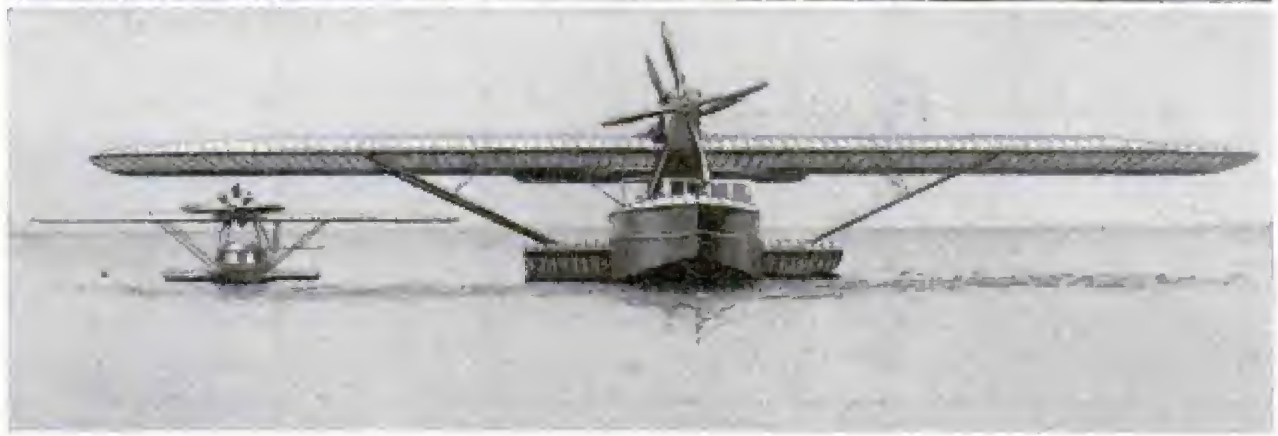
That the use of queer-looking musical instruments is not wholly a feature of the modern "jazz" age, is seen in the odd "serpent" piece which was said to be an essential part of most military bands up to 1800. It fell into discard about that time, its distant "cousin" being found today in the saxophone. The instrument was made of wood and produced a baritone note of pleasing quality.

MORE CEMENT IN TILE REDUCES COST 2870

Reducing the cost of a building material by increasing the quantity of cement used in its manufacture sounds paradoxical, but that is what a Los Angeles producer has done with a special hollow building block. Because of the greater strength of the unit, there is less loss from breakage during handling, and a load can be dumped from the trucks without damage, saving time and labor expense involved in unloading by the hand method.

Willmore-Wiley Corp.
2002 21st St. New York, N.Y.

PLANES PLANNED FOR TRANSATLANTIC SERVICE



Sixty-Passenger Flying Boat Produced in Germany for Transatlantic Service, and the Same Ship, with One of the Standard Half-Dozen-Passenger Kind beneath Its Enormous Wing

Instead of being ten or twenty years in the future, regular transatlantic airplane service may be just around the corner, if new planes now under construction or planned measure up to their builders' hopes. In Germany two designers, Prof. Junkers and Dr. Dornier, are laying plans to be first in the Europe-America air service. The Dornier factory, whose Dornierwals have set many records in size and weight-carrying ability, has already produced a flying giant with room for sixty passengers, driven by two 1,000-horsepower engines and with a cruising radius of 4,000 miles.

Prof. Junkers, the designer of the Junkers planes used on a number of the longer

commercial air routes abroad, is working on plans for an enormous ship with room for 100 passengers. It really will be an immense flying wing, 400 feet in length, with cabins and whole suites contained within the wing, as well as the engines, for which he proposes to use four Diesel motors. Beneath the wing, twin fuselages would carry crew and operating rooms, and provide the floats for alighting on water.

Government officials at Washington are equally interested, and the aviation section of the department of commerce has prepared figures to show that a profitable air line could be operated with ordinary small planes by building a series of floating islands at 500-mile intervals across the

Company. Friedrichshafen, Germany.

ocean. The proposed islands would be horseshoe-shaped, anchored at the nose so they would swing with the wind and always present a basin of calm water between the two wings. Flying into the basin against the wind, seaplanes could alight easily. The wings would be topped by shops, hangars, storage warehouses and hotels for storm-bound passengers.

With these refueling depots at 500-mile intervals, planes could be operated across the ocean with the minimum of risk. The floating-island plan contemplates two aerial routes to Europe. The northern and shorter route would require only three of the sea bases, while the southern route, for winter flying, would necessitate four or five. The advantage of the island plan over non-stop flights is that a plane, since it must necessarily carry all its fuel while in the air, is more profitable on short flights than long ones. The difference between the fuel needed for 500 miles and that needed for 3,600 miles is considerable, and if that difference is saved for pay load, the air line stands considerably better chance of making a profit.

SQUARE FIFE HAS BETTER TONE AND MORE POWER 2424

Improved tone and increased carrying power are claimed for a fife that has a square instead of a round body. According to the inventor, it is the result of some forty years' testing and experimenting, and its greater power has been gauged by actual sound measurements.



Built with a Square Tube Instead of Round, This Fife Is Claimed to Have Better Tones



Hunted for Its Queer Horns, a Sheep from the Almost Inaccessible Mountain Peaks of the Himalayas

SHEEP FROM ROOF OF WORLD PRIZED FOR QUEER HORNS

One of the species of wild goats found among the lofty peaks of the Himalayas, is notable for its twisted horns. They somewhat resemble huge screws, are three feet long and are set on the head to form a "V." The home ranges of the animals are nearly inaccessible to hunters.

SUNFLOWER LIFE PRESERVERS LIGHTER THAN CORK 2489

Life preservers are being made in Germany from the pith of the sunflower. The material is said to be four times lighter than the hair of the reindeer and eight times lighter than cork.

Myr. Noah Skinner described in Russian

2498
Barney



Loading Tinplate and Box Shooks on the "Star of India," at Alameda, Calif.; a Donkey Boiler on the Dock and the Catted Yard of the Mizzenmast Serve as Cargo-Handling Crane

By H. H. DUNN, 2722 Prince St
Berkeley, Calif.

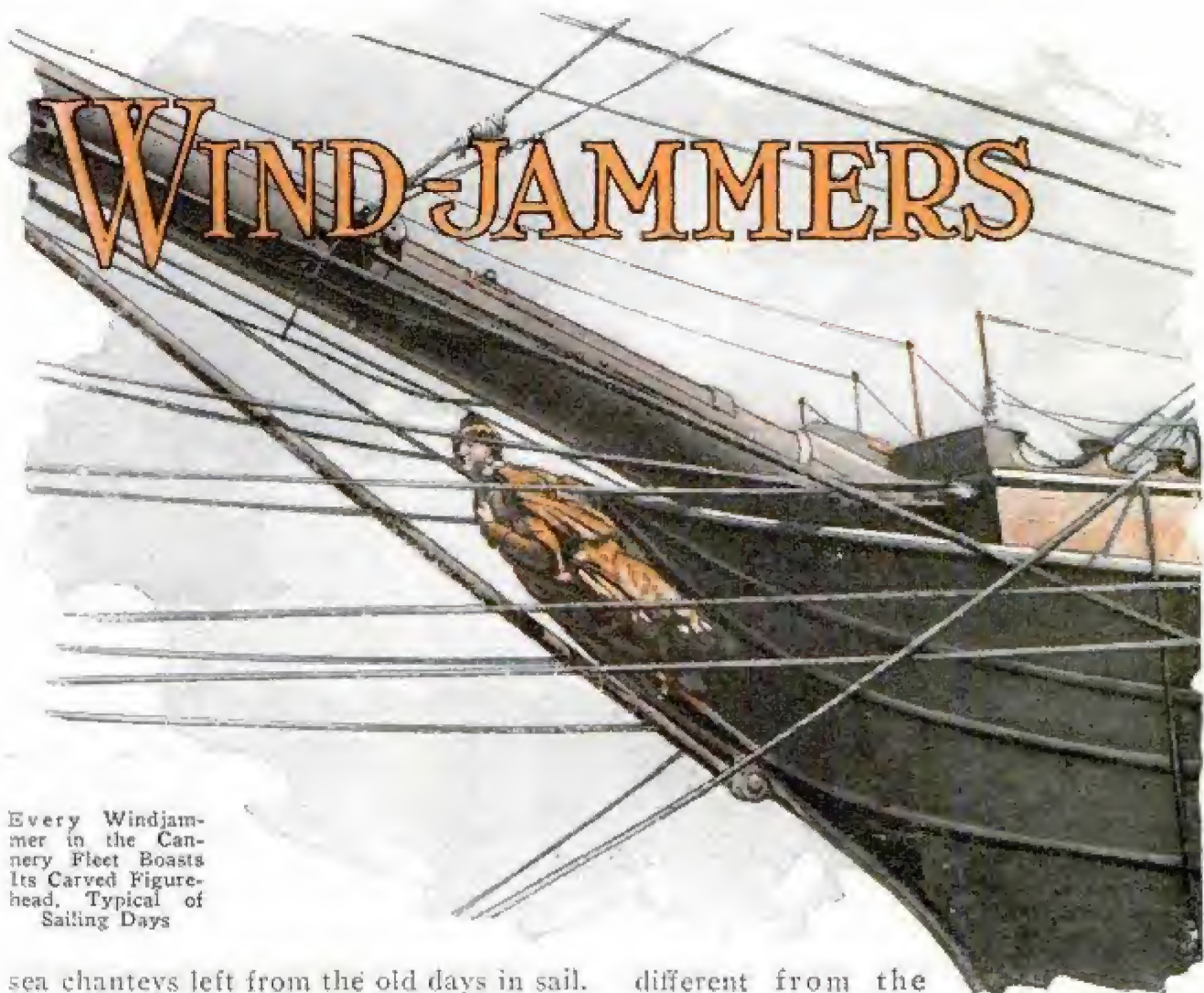
ROMPING up and down the Pacific coast as swiftly as they sailed the seven seas half a century or more ago, the last fleet of windjammers in the world each year links the Golden Gate with the Aleutian isles. "Through fog to fog, by luck and log, they sail where Bering sailed," bearing the Stars and Stripes with that same daring which characterized the square-riggers of the seventies. Modern mechanical devices, ranging from radio to refrigerating plants, have made them able competitors of steam, and they bring to your grocer the annual crop of canned salmon, taken where Alaska's coast bends toward the pole.

They are the fleet of the Alaska Packers' association, a co-operative organization of fishing companies operating in Alaska, and almost as old as some of these famous ships themselves. There are fifteen of the sailers, twelve of steel and three of iron, ranging from the "Star of India," built in 1863, in

Ramsay, Scotland, to the "Star of Lapland," largest sailing vessel under the American flag, built at Bath, Me., only twenty-five years ago. They are known in all the ports of the world, where, under various names, they have fluttered their starry pennons in the passenger, freight and mail services. Coming to their present owners, they were renamed "Stars" of various countries, so that they are known and recognized as the "Star Fleet."

In April of each year, they leave their mooring place in the estuary, at Alameda, Calif., bound for Bristol bay, Alaska, whence they return in October, once more to lie snug in the estuary until April calls them northward like migrating swans. During the winter they are overhauled thoroughly, and then, in the spring, huge tugs pick them from their moorings, tow them through the Golden Gate and turn them loose. Topsails, gallants and royals are broken out to the time of the last deep-

111 California St
San Francisco, Calif.



Every Windjammer in the Cannery Fleet Boasts Its Carved Figure-head, Typical of Sailing Days

sea chanteys left from the old days in sail. Dripping towlines are hauled in through the chocks; towering blankets of canvas covering the naked spars are flung out, the wind fills them, the long swells of the Pacific catch the hulls, the great ships heel to the power of wind and wave, and once more a fleet of windjammers foots the seas.

In the holds are cargoes of tinplate for cans, shooks for cases, supplies for the canneries, and food for 200 to 240 men a ship for five and one-half months. One might think this a tremendous crew for a wind-powered vessel, and so it would be were they all sailors. Instead, they are the fishermen who will take tons of salmon during the short season on Bristol bay. On the way up and back, all of them work ship, but, once arrived at the anchorage in Alaskan waters, all take to small boats for the fishing, leaving only the captain, the cook and the latter's assistants on board. They are fishermen first, and sailors afterward, though each ship's company is sprinkled with old-time sea dogs.

Each ship, though still a sailer, is vastly

different from the windjammers which carried the American flag to every port in the world in the last half of the nineteenth century. Steam engines on deck and below give power for handling the sails, loading the cargo, sheeting home the anchor, and catting the yards to serve as cranes for the movement of heavy packages to and from the ship.

Radio, refrigerating plants and refrigerators, typewriters, motion pictures, and the best and freshest of food, not to mention distilled water, make pleasant the modern sailor's life. Light, roomy quarters, equipped with electricity and other conveniences, have replaced the "cockroach heaven" of the forecastle of the old-time sailing ship, while the rooms of the captains and officers compare favorably with those on any steamers, except the very largest liners.

Leader of this last sailing fleet is the "Star of Lapland," largest vessel of her kind flying the Stars and Stripes. She is a four-masted, steel-hulled bark, a thing

of beauty as ships go, her masts rising better than 200 feet, trimmed with a cobweb tracery of backstays, braces, lifts, hal-yards and clewlines. She is double and topgallant-royal rigged. She has the high-reaching flare and the overhang of a yacht, a saucy "rake" to her masts, and such perfect balanced proportions as to bring back memories of the clippers of the sixties and seventies.

Attached to every one of these ships is a chapter of maritime history, but many of them are passing to the ports of missing ships, due to the encroachments of steam, and the fact that one steamer will carry as much cargo as three of the windjammers, and make the passage in one-third of the time. The "Star of India," built at Ramsay, Scotland, in 1863—sixty-four years ago—has gone to San Diego, to be converted into a marine museum. The "Star of Peru," launched in the same year at Sunderland, England, is ending her days, sans masts and spars, as a coal barge at Noumea.

where, whenever she moves, it will be at the mercy of a tug, instead of the free will of her once swanlike wings. She has been rechristened "Bougainville."

The real reason for the sale of these older ships is that their cargo-carrying capacity proved too small alongside the larger sailers, such as the "Stars" of Lapland, Shetland, Zealand, Scotland, and others. When these largest and last of windjammers arrive in Bristol bay, they unload thousands of flat sheets of tin, millions of printed labels, hundreds of tons of box wood, nails, and other cannery equipment. On the way up, their sails have been worked largely by power supplied from donkey engines on deck, and, tied up at the piers of the Alaskan port, these same engines, with a catted spar for a crane, discharge the ship, so that the great majority of the sailor-fishermen may get to their fish-



Folding Her White Wings as She Comes About, to Enter the Golden Gate, "The Star of Lapland," Largest Sailing Ship under the U. S. Flag, Scorns a Tug to Help Her up San Francisco Bay

2541

ing. When the pack is finished, late in September, the tinplate has been made into cans and filled with salmon, thousands of tons of it. The wood is converted into boxes and crates. The catted yards again are called into use, and the holds piled to their limit with the crates. The crews pile back on board, and, with the exception of the watchman, the canneries are deserted. The last ropeslingful of cases comes inboard. On fore, main and mizzen yards, the men loosen sail, gaskets are let go, buntlines are freed, steam winches hooked up, and donkey engines put to the jobs at which sailors once wore out their hands.

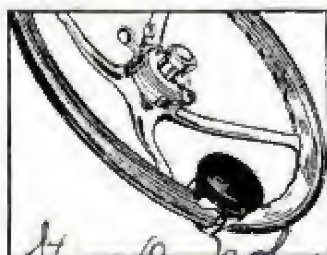
Topsails are broken out, fore-and-afters, topgallants, royals and courses spread to the wind from off the pole. The old-timers, still sound and sturdy as the day they slid down the ways, heel gently, come into the breeze enough to lift the weather clews, fill their sails with the wind, and the race to the Golden Gate is on.

They clear the rugged and dangerous Alaskan coast; they stand out a bit farther; they begin to draw apart, the faster and better-sailed square-riggers leaving their fleet mates behind, and the Star fleet comes bowling down the sunset side of the continent, the only place in the world where such a sight can be seen.

Last year, the "Star of Shetland" led the fleet, a snow-white bone in her teeth, every sheet drawing taut, her helmsman steering "full an' by," her crew laughing over the rail as the squadron faded into distance.

HANDLE FOR STEERING WHEEL LEAVES ONE HAND FREE

With the aid of a knob grip that is easily attached to the auto steering wheel, one hand can guide the car while the other is left free to change gears. It is of convenient size and shape and fastens securely to the wheel rim.



Whipple Mfg Co
2371 60th St



Japanese Craftsmen Are Experts in the Art of Cutting Crystal Balls like This, Using But Two Simple Tools

CRYSTAL SPHERE OF FORTUNES SHOWS CRAFTSMAN'S ART

Quartz balls, fashioned by Japanese artisans, are prized for their beauty, symmetry and clearness even if there is doubt as to their revelations. Some of the best specimens are cut with two simple tools as the chief instruments, a piece of steel to round the angular quartz block into a sphere and a bamboo joint to give the final polish. The art of cutting the crystals is handed down from father to son, the skill of the craftsmen being manifest in the mountings prepared for the spheres and in shaping them.

KINDS OF ROCK IN THE MOON SHOWN BY LIGHT RAYS

By examination of the light reflected from the moon, Dr. F. E. Wright of the Carnegie Institution has determined that there is pumice and granite on its surface. Light reflected from these substances was used as a basis for the study.

Eschphysiocal
Laboratory

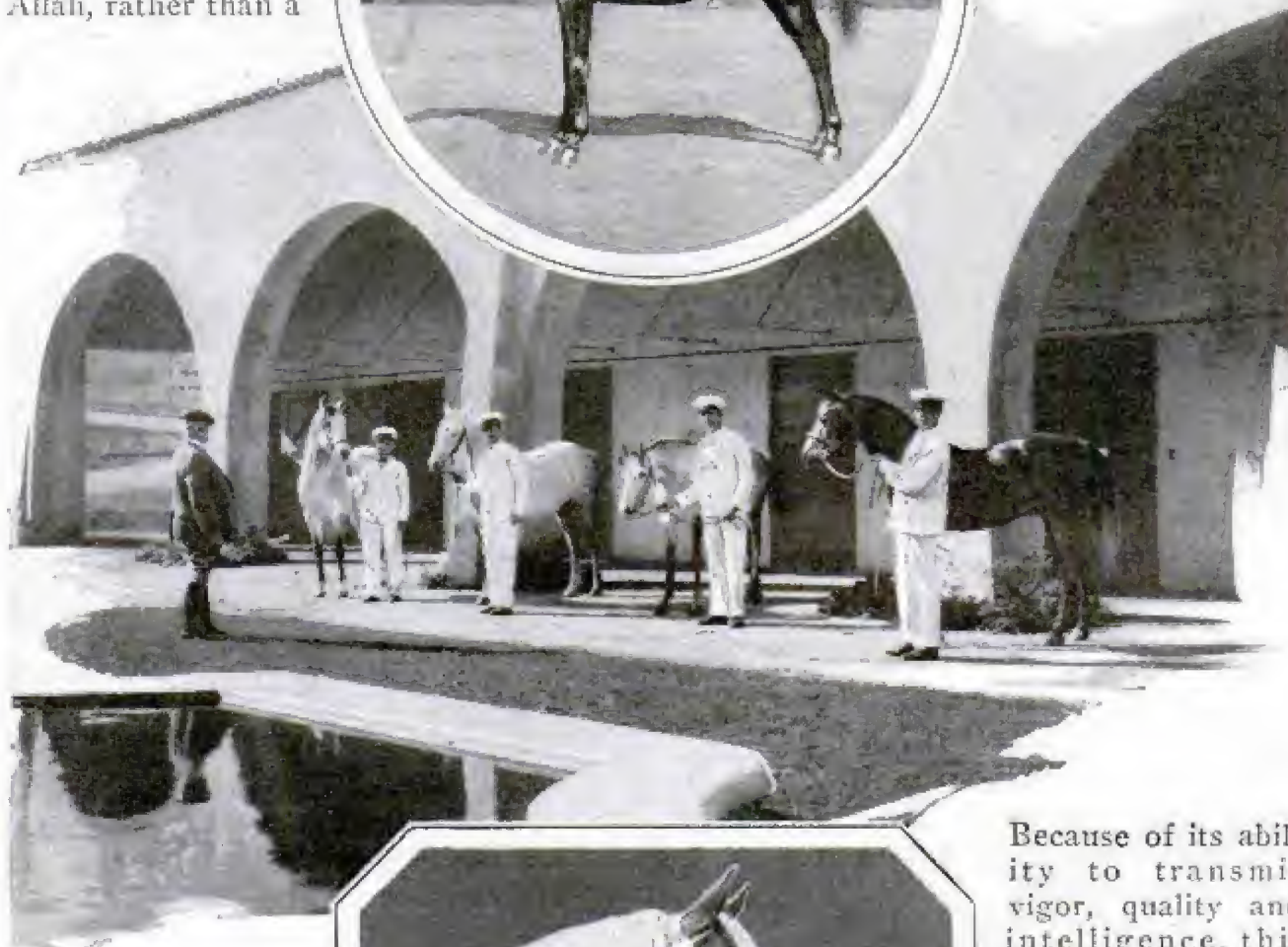
2541
Beardsley Walcott
Newport, R.I.
Cont. H.

added Morgan Isen
collection. New York

ORIENTAL DESERT STEEDS ARE RAISED ON RANCH

There are three large farms in the United States devoted to the raising of Arab horses. The latest is a four-hundred-acre estate thirty miles from Los Angeles. It is a modern Garden of Allah, rather than a

present high standard. History is replete with accounts of the wonderful achievements of Arabian horses, their swiftness, beauty and docility.



Center, W. K. Kellogg inspecting his Arabians at Pomona, Calif.; Above, "Raseyn," Champion Four-Year-Old; Below, "Autez," a Six-Year-Old Beauty

Because of its ability to transmit vigor, quality and intelligence, this breed has always been regarded very highly as an improver of other breeds. Invariably, the Arabian is both gentle and affectionate, yet notably fearless, this latter trait being particularly noticeable in the young colts. In color the Arabian

mere horse farm set down in the center of the southland's great citrus belt. Although its origin is steeped in mystery, the Arabian breed of horses is said to be found at its best in Arabia proper, and in the Syrian desert, and perhaps found in its greatest perfection along the Euphrates river, where the Bedouin tribes have developed them to their

may be gray, bay, chestnut, brown, sometimes white, but very rarely black. It weighs from 900 to 1,000 pounds. The

And. Robert S. Lyons, 377 W. Myford St., Escondido, Calif.

gaits are the walk, trot, canter and gallop. They are easy to control and seldom become hot-headed. The Bedouins ride without a bit, doing their controlling with a rein attached to the noseband. Furthermore, they use only a pad without stirrups instead of the ordinary saddle, thus practically riding bareback. Primarily a saddler, the Arabian horse has been plentifully used for centuries in molding other prominent types and breeds.

THE STORY OF CORK ²⁷⁹⁷

Green oak trees of a certain variety are literally skinned alive to furnish the world's supply of cork. The stripping is not begun until the trees are twenty years old, the first crop being practically worthless, and eight or nine years are required to grow another. The trees will live and thrive until they are 150 years old or more. About \$6,000,000 worth is imported into the United States every year. When metal caps came into use for stopping bottles, cork growers feared a big slump in their business, but new uses for the material have been found. Cork is now widely employed in the manufacture of refrigerating outfits for homes, artificial limbs, hat linings, inner soles for shoes, cigaret tips, and in the making of linoleum.

KNITTING BALL HELD ON WRIST TO PREVENT DROPPING ²⁸⁴⁴

One of the latest aids to the knitter is a holder for the ball of yarn. It fits on the wrist, permits the thread to roll off easily yet keeps the ball securely in place so that it cannot drop or become snarled. For



Dropping the Yarn Ball While Knitting Is Nearly Impossible with This Holder That Fits on Arm

large balls, the unit has a spring inside the shaft that can be extended.

Karl Duttig,
Mills, Wash. Germany



Sculptor Lewis at Work on One of the Washington Heads for Monuments to Mark Auto Roads

HUGE STATUES OF WASHINGTON MARK ENTRANCES TO STATE

Tourists entering the state of Washington through any one of the four principal roads leading to the commonwealth, will be welcomed by a huge statue of the first president, mounted on a pedestal forty feet high. Officially, Washington is the only state in the union entitled to use such an emblem. The model illustrated here is being prepared by Alonzo Victor Lewis, a Seattle sculptor.

BIRDS THAT LIVE AT SEA ²⁷⁷⁸

When Col. Lindbergh was on his airplane flight to Paris, he noticed birds in mid-ocean and wondered how far they could fly from land and what they lived on. They probably were not seagulls, in the opinion of scholars, but might have been any one of several varieties of birds that commonly spend all of their time over or on the ocean, from the day they leave their breeding grounds in the early spring until they return again the next year. Seasnipes, phalarope and petrels are among these kinds, and one of the greatest sea flyers is the frigate bird. These species feed on small forms of ocean life, ride the waves like corks and survive the most violent gales with their heads tucked under their wings.

Kansas City Star
6/13/29

LEIPZIG'S TRADE FAIR IS AN INDUSTRIAL CARNIVAL



The Annual Fair at Leipzig, Germany, Which Draws Exhibitors from All Parts of the World and Buyers from All Europe, Is Really a Street Carnival of Gay Booths, like the Huge Vacuum Cleaner Above



Sandwich Men Parade the Streets Showing Enormous Alarm Clocks and Giant Spectacles, While Manufacturers Lavish Ingenuity on Such Oddities as Huge Chairs

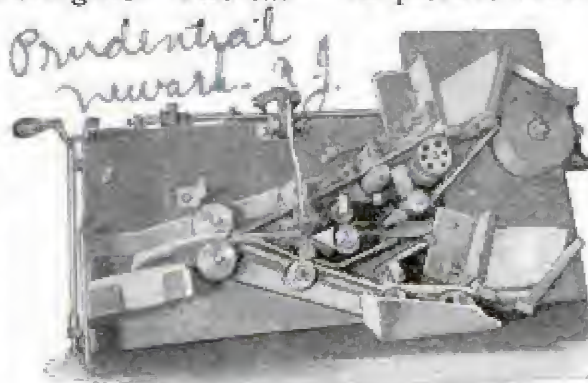


EARTHQUAKE MOVIE WITH CAMERA PREDICTED 277

Earthquakes may take their own motion pictures with cameras placed at strategic points and set in operation by the tremor, in the opinion of Comm. N. H. Heck, of the coast and geodetic survey, who points out that such a record of the disturbances would be of great value in studying how buildings stand the strain of collapse and how the ground waves actually travel. The cameras would have to be left in position in open spaces and arrangements made for changing the film to keep it fresh, but these details could be managed with little trouble, he believes. During the earthquake in Tokyo, scientists calmly remained at the seismograph while buildings were falling around them or taking fire, and Heck suggests that a motion-picture operator would have no more hazardous task in obtaining his film record.

CARBON-PAPER INSERTER SAVES TIME IN OFFICE WORK 1672

To simplify the task of inserting a sheet of carbon paper between printed forms and receipts, an insurance company has devised an apparatus which does the work at the rate of 4,000 sets an hour, equivalent to the performance of six girls. The carbon is fed from a roll, automatically cut to the required size and inserted between the forms. Varying thicknesses of stock can be used, and the outfit is adaptable to work on different weights and sizes of paper. A feed device prevents clogging.



Side View of the Carbon-Paper Inserter



Front and Rear Views of the Sunshade Auto Top Installed; There Is a Small Window in the Back for Looking Behind

BEACH UMBRELLA AS AUTO TOP NEW MOTOR ACCESSORY

Colored beach umbrellas are being used as tops for open roadsters, special attachments making the installation a matter of a few moments. There is an open space in the rear to promote safety, and both pole and ribs are strongly constructed.

BUTTERFLY IN PICTURE FRAMES LATEST ART NOVELTY 276

Butterflies of various kinds are mounted in picture frames by a New York dealer to form novel decorations, and suggest a practical use for collections of the insects. On some of the frames, pussy-willow twigs are introduced and the butterflies mounted at different angles to increase the realistic impression of the work.

*Safe investment
2958 N. Oakley Ave. Chicago*

*The Butterfly Store
300 Fifth Ave. New York City*

*Conceived by W.A. McIntyre
Superior Precision Tool Co. Toledo*

*Designed by Emil Mueller
mechanical printer
molder*

"VACCINE" INJECTED IN TREES SUBSTITUTE FOR SPRAYING



Doctoring a Tree by Pouring Its Medicine into the Container Renders the Tree Immune to Pests

Injecting chemicals into trees through a specially constructed spigot has been found an improvement over spraying to make the trees immune to various insects, according to a German landscape gardener. He bases his conclusions on results from experiments with 1,200 trees. The chemical preparation is applied from time to time and is absorbed by the trunk, spreading to the upper limbs and twigs.

MUSICAL TEST FOR MOTORS

By applying the principle of the xylophone to the brushes of electric motors, Dr. G. M. Little, research engineer of the Westinghouse electric manufacturing company, has developed a method for detecting defective units and thus averting accidents that might do extensive damage. A brush is worth about fifty cents when made of carbon, but might put an armature, valued at half the entire motor, out of commission if it failed. Dr. Little constructs a sort of xylophone, using the carbon brushes as keys. Then, employing one as a tuning fork and striking the keys with an ordinary drumstick, he determines by the pitch

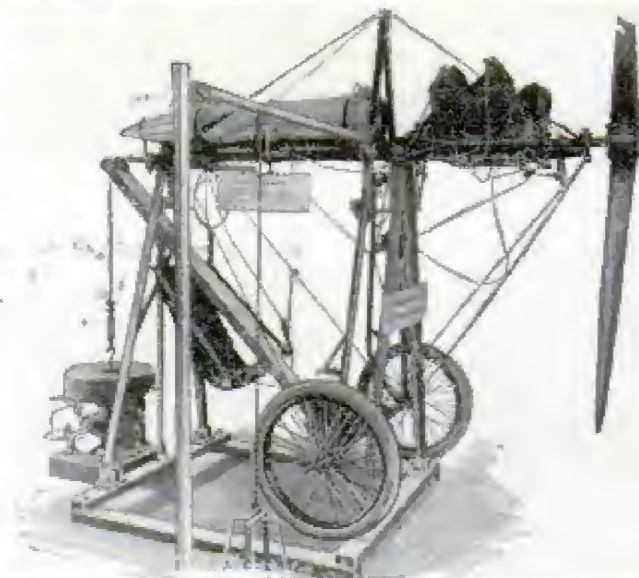
which are of good material and which are not. A standard note is G sharp. Brushes of a lower pitch are found to be defective. An A-pitch denotes satisfactory ones.

ARMY RUNS ITS OWN RAILWAY AT INFANTRY CAMP

One of the few narrow-gauge railroads now in active service in the United States is run by the army at the infantry-school reservation at Fort Benning, Ga. The road was constructed in 1920 to handle passengers, supplies and material over the 99,000-acre reservation. At that time, the roadbed was rough and unsettled, the equipment and motive power were in crude condition and wrecks and engine failures were frequent. Improvements have been steadily made until now the system has the latest type of equipment and is efficiently operated under the direction of the fort's quartermaster department.

AERIAL MOTOR PULLS WEIGHT TO DETERMINE POWER

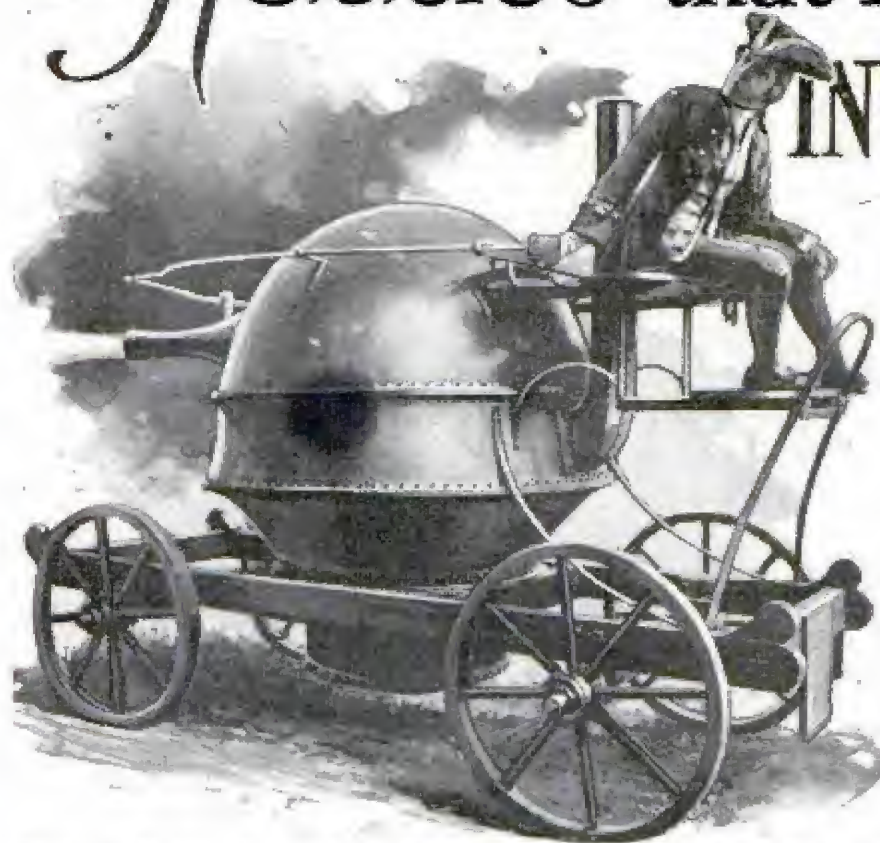
The strength of an airplane motor and the stability of the craft are tested at the Dresden technical university in a stationary-frame with weights and gauges. The outfit is so adjusted that when the propeller exerts a horizontal pull, it lifts a weight at the rear. Different types and sizes of propellers can be used and the frame is also rigged to show the approximate reaction of a real airplane in flight during the test.



Testing Outfit Used in Germany to Measure the Actual Forward Pull of an Airplane Motor and Propeller

Mr. James Clerk Maxwell
1823 2 St.
Washington, D. C. 2543

Hobbies that LED to INVENTIONS



Sir Isaac Newton Designed This Locomotive in 1690, but Never Built It; an American Railroad Constructed the Model from His Drawings

By C. FRANCIS JENKINS

NEARLY all important inventions have developed out of hobbies. A man wants something to play with, outside of his workaday occupation. Taking it up in his leisure hours, he may be led to the finding of a new and useful idea.

Fifty years ago Emile Berliner was a clerk in a dry-goods store. For amusement, he took up the study of electricity. In textbooks on physics he found interesting the chapters relating to sound. When the invention of the telephone was first made known, in 1876, he was struck with the notion that it might be possible to transmit sound by electricity. For an experiment, he bought a toy drum and cut it in halves. One of the halves provided him with the means he needed. To the center of the drumhead, inside, he glued a small disk of wood, and through it stuck a sewing needle far enough to make its point protrude a very little way at the front of the drumhead. Then, from the rim of the head he suspended, by a metal string, a steel-ball button, so that it hung against

and in loose contact with the point of the needle.

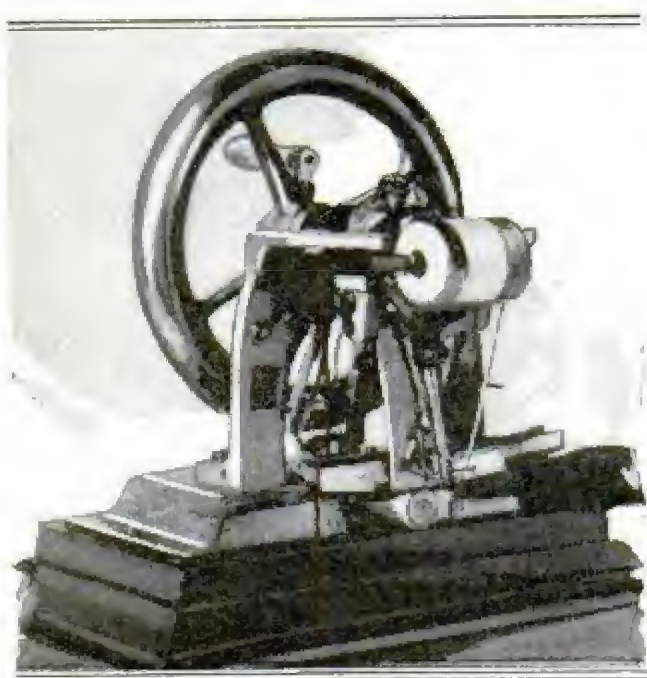
With a simple arrangement of wires he caused a current of electricity to pass through the point of contact, by which means the current was thrown into vibrations at the point of contact and onward over a line wire to a distant Bell telephone receiver. When, thereupon, he spoke against the drumhead, a listener at the other end of the wire caught his words.

It was the first telephonic microphone, which rendered practicable the subsequent great development of the telephone. With the original Bell instrument it

was necessary to speak loud and very distinctly, putting one's mouth into the transmitter, while the receiver, conical in shape, was inserted into the ear. The Berliner invention supplied a battery transmitter which threw the voice into electric waves corresponding to sound waves, by means of a loose contact.

Alexander Graham Bell was a school-teacher. Study of sound became his hobby, and led to his becoming an instructor of the deaf. He taught classes of deaf persons with the help of a contrivance of his own, which was an arrangement of multiple rubber tubes, through which he could speak to a number of pupils at once.

It is said—whether truly or not—that the idea of the telephone was first suggested to Mr. Bell by a toy that was popular with boys fifty years and more ago. When two topless tin cans were connected together, by a long string fastened to their bottoms, words spoken into one of them were audible at a considerable distance by a listener who held the other can to his ear, the voice



vibrations being transmitted along the string.

I understand it to be a fact that Bell took his first working model of the telephone to a government official, hoping to interest him in the invention; but the official could see in it nothing of practical usefulness, and said: "I dare say your contrivance works excellently, but who would want to talk through a thing like that?"

Nearly all great inventions have been products of poor men's imagination and ingenuity. Money develops but does not originate. Edison was of humble birth, his father a maker of shingles at a period when all shingles were made by hand labor. His first job was that of a train boy, selling newspapers and candy. At risk of his life, he saved a small child from being run over by a freight car, and the father of the child, in gratitude for the service, taught the boy the rudiments of telegraphy.

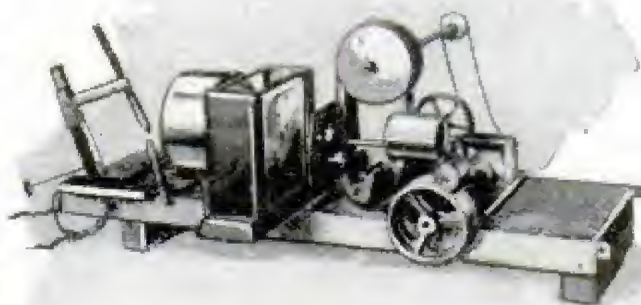
Young Edison made telegraphy his job, and became a remarkably speedy operator, earning high wages. But he wanted something else, outside of the day's work, to occupy his mind, and so, before long, he

developed an ingenious telegraphic device, which he offered to a company on Broadway, New York City.

This invention, as the result of a test, proved valuable, and Edison was summoned to an interview with the president of the company. As the story goes, the president said to him, "You inventors have a way of setting fabulous values on your ideas. I will pay you \$36,000 for your contrivance, if you care to accept that. You can take it or leave it."

The young man had trouble to conceal his surprise and delight. He had expected to get not more than a few hundred dollars. When a check for the amount was

handed to him, he could hardly believe that it was real money; and he felt convinced that it was only a joke when the teller at the bank on which the check was drawn refused to cash it for him. The difficulty, however, proved to be merely a matter of identification.



Three Original Models, Elias Howe's Sewing Machine, the First Movie Projector, and Emile Berliner's Telephone Microphone

George M. Westinghouse learned the trade of a machinist in Schenectady. Mechanical things possessed for him an extraordinary fascination and, when nineteen years of age, he invented a "frog" to put back derailed cars on railroad tracks. He was only twenty-one when he invented the airbrake, which is said to have been suggested to his mind by a railroad wreck he chanced to witness and by an article on pneumatics in a discarded magazine that he happened to pick up while traveling.

The story is that he offered the airbrake to an official who was at that period one of the foremost among American railroad men.

"Do you mean to tell me," said the official, "that you can stop a railroad train with wind?"

"Well, yes, if you choose to put it that way," replied young Westinghouse.

"I have no time to waste on fools," said the magnate, terminating the interview.

Nevertheless, the first train experimentally equipped with the airbrake stopped so suddenly



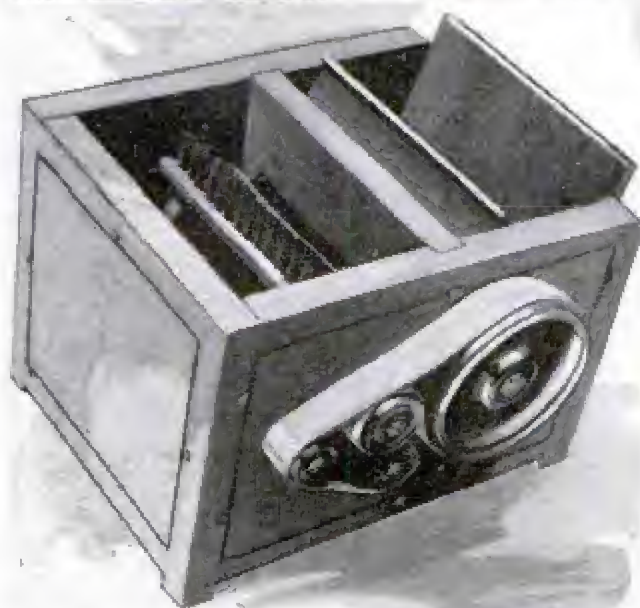
that it was wrecked. The airbrake made high-speed railroad-ing possible, and is reckoned to have saved more lives than Napoleon lost in all his battles.

The Wright brothers, Wilbur and Orville, were earning a livelihood by repairing bicycles at Dayton when they took up flying as a hobby. Neighbors were accustomed to speak of them as "those crazy

Wright boys." Their early experiments were "gliders." At that time the patent office itself looked upon flying machines as pretty nearly in the same class with perpetual-motion contrivances. The rest of the story tells itself.

Mergenthaler, who invented the mechanical typesetter, was a maker of telescopes and other scientific apparatus. The famous astronomer Herschel built his wonderful telescopes and astonished the world by his discoveries while earning a living playing the fiddle at dances, concerts and other entertainments.

Morse, inventor of the telegraph, was a portrait painter. Stephenson, who developed the locomotive, was a Welsh coal miner. Corliss, inventor of steam engines,



Mrs. Nancy Johnson's Original Ice-Cream Freezer of 1843; Bell's First Telephone Model, and Eli Whitney's Original Cotton Gin



German Cartoon of 1830, Making Fun of Illuminating Gas; the Covered Buckets Were Supposed to Contain Gas for the Walking Street Light

made his experiments after working twelve hours a day as a meat cutter. Eli Whitney, a Connecticut Yankee, was a cabinet-maker by trade. On a visit in the south, he saw negroes separating cotton from the seed with their fingers, a slow and laborious operation. It occurred to him that the work might be done by a machine, and hence his invention of the cotton gin.

William Murdoch, a poor mechanic at Redruth, in Wales, was struck with the idea that gas from coal might be used for lighting. That was 1796. He lighted his own humble home by that means, and his neighbors became convinced that he was in league with the devil. When Murdoch's invention was first considered by a committee of parliament, a member said to him, "Do you mean to tell me that it is possible to have a light without a wick? Ah, my friend, you are trying to prove altogether too much."

It was supposed at that time that living flame passed through the pipes, and, when illuminating gas was first experimentally introduced in the house of commons, fire engines were at hand with hose laid ready.

The first motion-picture projecting machine was my own invention. I was then a stenographer. I took delight in mechanical things, working at them in my leisure time. My projector was the outcome of a hobby, but eventually proved to be the

prototype of the projecting machine in every theater the world over to this very day.

Thomas Jefferson's pet hobby was mechanics, for which he had a "flair," as evidenced by his invention of the swivel chair and the copying press. The former is in universal use today, while the latter, until superseded within recent years by other devices, was deemed indispensable to the equipment of all business offices.

It pays to have a hobby. A hobby makes life more interesting, and there is always a possibility that pursuit of it may lead to

something worth while in the way of invention or discovery.

GAS STATION LIKE UMBRELLA SERVES MANY CARS

Besides being ornamental, an umbrella-shaped gasoline filling station in Portland, Oreg., has practical advantages in that cars can arrive and depart at all angles and there are no posts or obstructions.

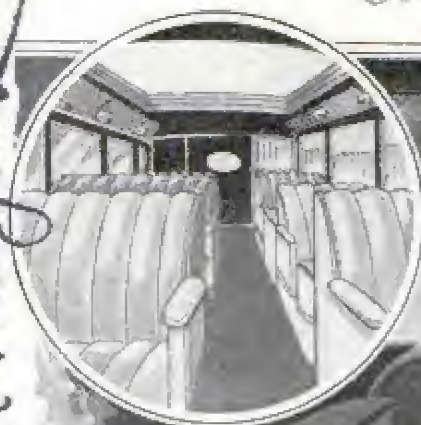


Unique Shelter for the Gasoline Pumps of a Filling Station Provides Protection without Bulky Columns

Five pumps are provided. The umbrella roof is attractively lighted at night.

Carl Carlton Isroak
of Empire Theatre The

Castiglione 23 Haymarket, London, S.W.1



Luncheon Tables on the Back of Seats, and an Unusual Luggage Carrier beneath the Car Feature European Tourist Bus



MOTOR COACH WITH KITCHEN NEWEST TRAVEL LUXURY

Conveniences generally found only in the most luxurious railroad cars are afforded travelers in motor coaches built for a tourist line in Europe. There is a kitchenette from which afternoon tea is served daily. Each seat has a folding table, under the glass top of which is a map of the day's run, and passengers are given luggage cases that fit under the bus in a dustproof compartment. The grips become theirs after the journey. The coaches have sliding tops that can be pushed back to afford an unobstructed view above. Toilet facilities, wide aisles and armchair seats are other comforts.

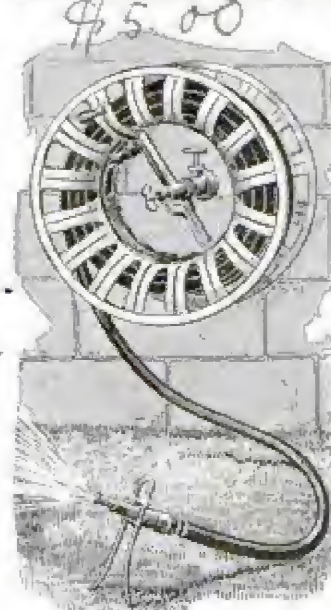
NEW RAY FOR SKIN TREATMENTS LATEST MEDICAL AID

Reports of successful treatments of skin diseases with the "grenz ray," a form of radiation shorter in length than the ultra-violet light and longer than X-rays, were made before the American medical association recently. Since the new ray is not so penetrating as the X-rays, it is believed that it may be used with little injury to the skin. Favorable results have been obtained with it on twenty-seven kinds of

skin diseases upon eighty-seven patients it was claimed. Another medical aid is heparin, a substance obtained from the liver of dogs to keep the blood from clotting during transfusion operations.

DETACHABLE REEL ON FAUCET PROTECTS HOSE

Hose is kept from kinking and knotting when wound on a detachable reel that may



be quickly clamped to the faucet or removed and hung on the wall when not in use. It has a capacity of 125 feet of five-eighth-inch hose, is made of galvanized iron and weighs but little. A nickel-plated faucet is furnished with it. The reel protects the hands, saves time and work, and, as it can be easily moved from

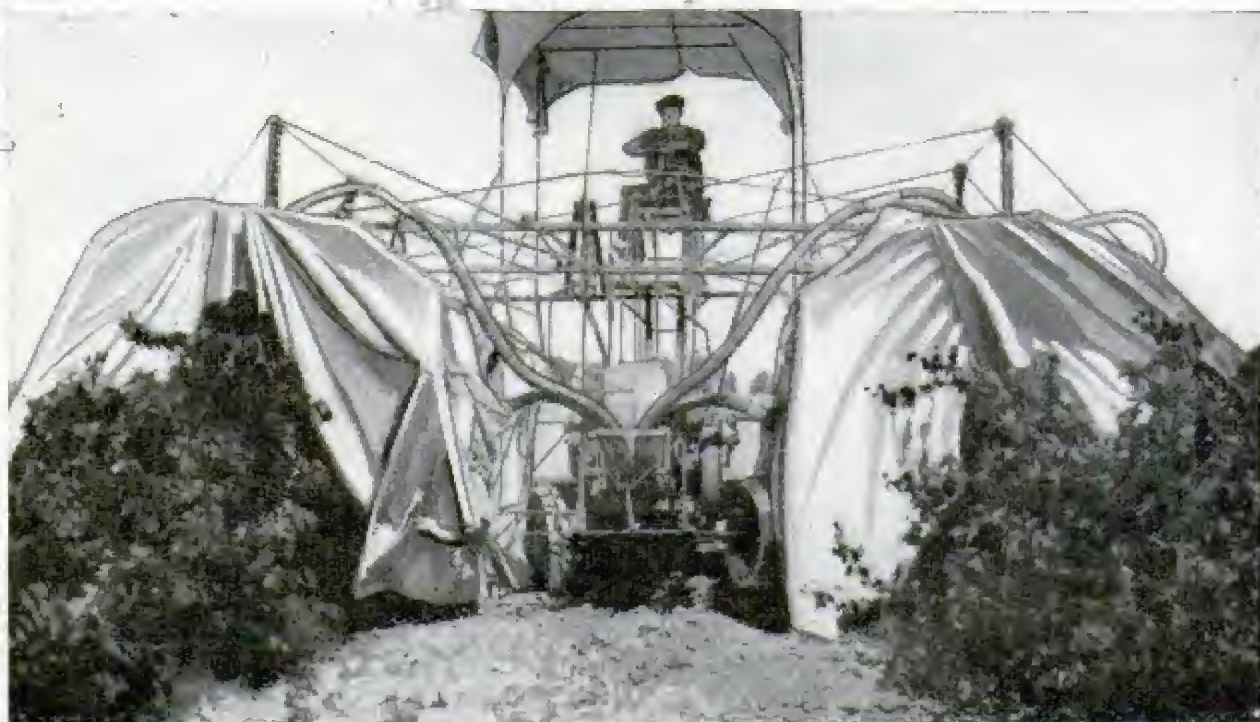
one outlet to another, considerably less hose is required, and the absence of kinking prolongs its life.

Long ray machine made by Castiglione 23 Haymarket London S.W.1

discovered by Dr. J. J. Allen and Dr. Eustace Pouchy. 73 E 80th New York

Kansas City Star

The Specialty Mfg. Co.



Killing Insects on Two Rows of Plants at Once, the "Spider" Fumigator in Operation; the Canvas Tents Keep the Dust from Blowing Away Too Soon and Help Expose the Branches

"SPIDER" MOUNTED ON TRACTOR FUMIGATES PLANTS

Resembling a huge spider, a dusting apparatus, mounted on a tractor, spreads insect-killing preparations on plants at the rate of twenty-five acres a day. The dust is distributed through four nozzles and is kept from blowing away by a canvas covering, one on each side of the machine. These have flaps that closely surround the plants and give each one an intensive dusting for about eight seconds. The outfit is adaptable to different field crops and to rows of various widths.

PORTABLE ELECTRIC HANDSAW WEIGHS TEN POUNDS

A portable electric handsaw, which weighs but ten pounds and has the saw blade mounted directly on the armature shaft, eliminating all gears, embraces several novel features. A cooling fan on the motor is arranged to exhaust inside the saw guard so that it blows the sawdust away. Most of the parts are made of



aluminum or duralumin, which accounts for its light weight. A seven-inch combination saw, for either crosscutting or ripping, is standard equipment, but hollow-ground saws for particularly fine cutting, or other special types, can be furnished. Motors for either 110 or 220-volt direct or alternating current, of 25 to 60 cycles, are supplied with the outfit.

EARTHQUAKE RECORDER IS AID TO INDUSTRY AND COURTS

The seismograph, the delicate instrument used in recording earthquakes, is finding a place in industry as an aid to the location of oil domes, helping to solve railroad claims and to determine whether the vibrations due to blasting in large constructive undertakings are detrimental to surrounding property. Its service to the oil hunter lies in the fact that the earth waves set up by the explosion of dynamite, travel from two to four times faster through the salt domes where oil is more likely to be found. Hence, by setting off charges about a seismograph as a center, the prospectors can gain a fairly accurate idea of the character of the ground below the surface and be guided in sinking their shafts. Recently, when residents near a cement-block factory in the neighborhood

of New York city objected because they believed the vibrations from the heavy machinery cracked the plaster in their homes, a seismograph was set up to measure the jars and showed that they were no greater than those caused by a man walking across the floor of a house. The suit, started by property owners, was thrown out of court as a result of the instrument's evidence. Seismographs were used in measuring the force of the explosions while blasting out the East river tunnel in New York to prevent breaking water mains and causing other damage. When a greenhouse owner asserted that moving a railroad line fifty feet nearer the glass structure caused breakage of the panes due to the vibration from the trains, a seismograph proved that the closer location had increased the force of the vibrations hardly a millionth part. In another case, it was shown that heavy quarry blasts did as little damage to houses a quarter of a mile away as a person walking in them.

ELECTRIC BOAT FOR CHILDREN RUNS ON BATTERIES

Started or stopped simply by turning a switch, an eight-foot boat is run with current from two storage batteries and develops a speed of seven miles an hour. It will go for about fourteen hours continuously on one charging. The motor used is a common type of automobile starter and is rewound so that it will reverse the drive shaft whenever it is necessary to stop the boat or back it out of the docking place. The craft is especially suited for fishing, as it is silent, and the same feature makes it suitable for use in duck hunting.



Easy to Operate and Steer, the Electric Boat Is a Source of Fun for Children
and Is Good on Fishing Trips, as It Is Silent

AUTOMATIC CIGAR LIGHTER HAS
LARGE GAS FOUNT 2576



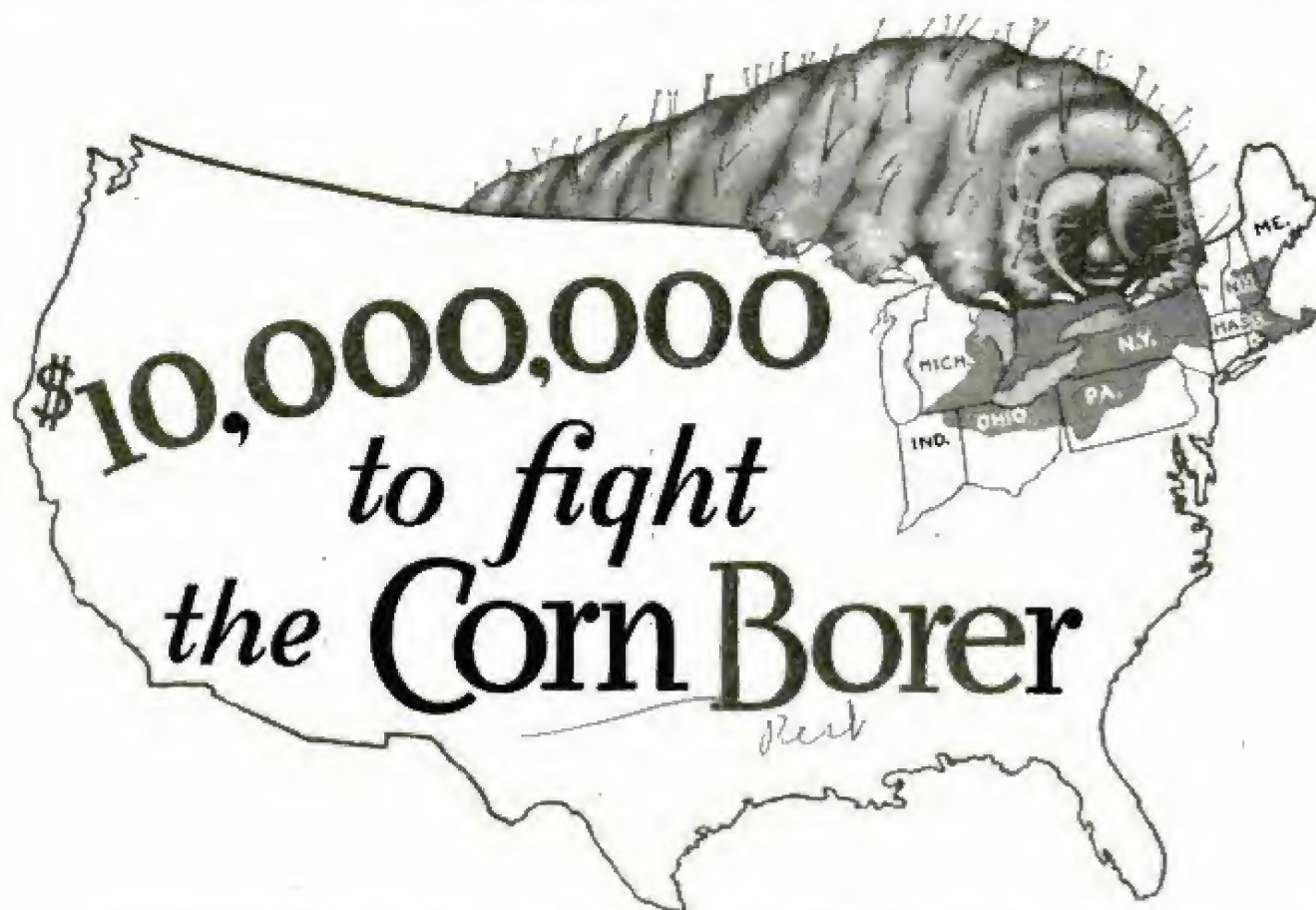
How Cigar Lighter Is Used and Base That Holds It to
Ash Tray; It Has Large Container for Benzine

An automatic cigar lighter with an unusually large fount for the benzine is being manufactured. Besides the extra-size gas supply, which removes one objection to previous lighters, the mechanism has several novel improvements. It is being manufactured as an individual unit on its own base, without a base to fit in a small cup attached to the ash tray, instead of the usual match-box holder, and in the same form is being placed on lamp-stand trays.

**AIR FILTER HELPS HAY FEVER
BY KEEPING OUT POLLEN 2**

Persons suffering with hay fever, asthma and similar ills are said to receive marked relief in rooms where the air is specially filtered to keep out the pollen of weed and plant blossoms, often at least partly responsible for the ailment. It is arranged to suck air in at the rate of 150 to 200 cubic feet per minute, sufficient to change the air in the average bedroom in five or ten minutes and is operated by a fan run by an electric motor.

Mr. F. J. Jorgenson,
4063 E. 16th St. Cleveland, Ohio.
Steele & Johnson Mfg. Co., 4 W. Wabash
Chicago.



Government Spending Huge Sum to Wipe Out the European Pest, Which Threatens Great Staple Crop

TEN million dollars is the price that has been placed on the head of an insect by the United States government—the largest reward ever offered for the extinction of any living thing. The millions, however, are considered but a small price to pay if the European corn borer, an imported pest from overseas, can be wiped out in time to save the \$2,000,000,000 annual corn crop.

The borer is believed to have come to America in broom corn imported from Italy and Hungary. From broom plants in New York and Massachusetts it spread to the fields, and then began a western march which has already reached at least one county in eastern Illinois. With the exception of parts of Indiana, it has not as yet penetrated the heart of the corn-producing country, and with ten millions to spend fighting it, experts of the department of agriculture hope to hold the pest in check until some means of eradicating it can be found.

Though corn is its favorite diet, the borer will eat almost any kind of vegetation, being particularly inclined toward

beans, beets, potatoes, hops, celery, cow-peas, rhubarb and garden flowers, such as the aster, chrysanthemum, gladiolus, dahlia and sunflower. Even weeds can support it, and heavily weeded patches have been found to contain as many as 400,000 borers to the acre.

To meet the attack, the federal government, besides providing ten million for equipment, has enlisted the aid of the individual states, not only financially, but through special legislation to enforce the co-operation of the farmers. Heavy fines have been provided to back up the quarantine regulations, which prohibit the transportation of any plant in which a borer may be concealed. Warning signs are posted at the limits of infected territory, forbidding the carrying of green corn beyond that point, and last year several hundred thousand automobiles were stopped by patrols and immense quantities of green corn confiscated and destroyed.

Unless carried into new territory by moving of corn, the normal advance of the borer, all in the summer moth-flying season, has been about twenty miles a year,



Wiping Out the Larvæ of the Corn Borer by Burning the Stubble and Surface of a Corn Field; the Nozzles Generate a Heat of 1,400 Degrees as They Are Dragged Along

though last year, because of high winds, it leaped about fifty miles ahead. The only practical method of wiping it out is destruction of everything in which it may be lodged, since it resists all known poisons. Five species of corn-borer parasites found in France, however, have been imported, and this year 500,000 of the parasites, hatched from cocoons in special incubators, are to be liberated in Ohio to test their ability to wipe out the borers.

The main attack, however, will be made on more than 400,000 farms, having 2,500,000 acres of corn land. Train loads of tractors have been purchased by the government, to be used in plowing up the land and destroying every vestige of corn stalks and cobs. Farmers who do the work voluntarily will be paid \$2 an acre by the government, and those who refuse will have their premises cleaned up by government crews and will be charged the bill, in the form of special taxes. Unless the campaign succeeds in checking the pest, it may be necessary to restrain planting of corn for a year or two in the infested regions.

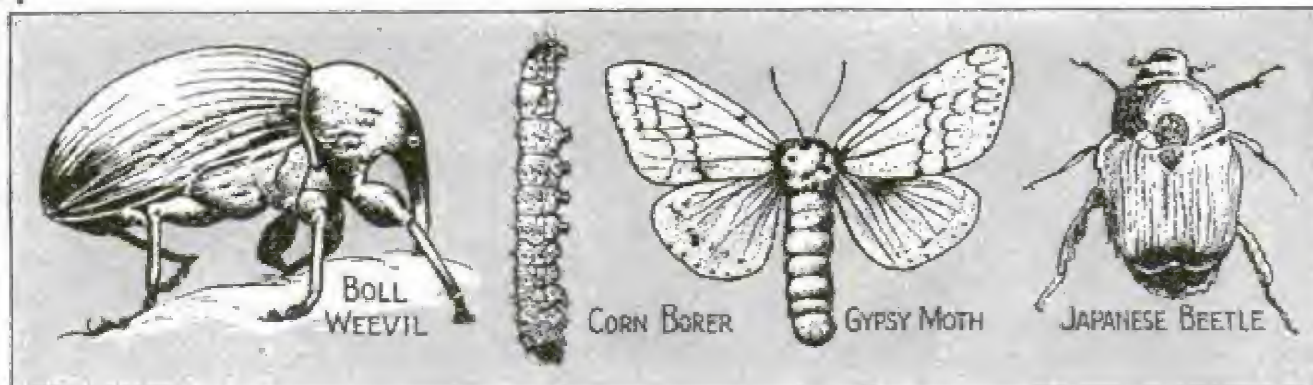
The borer does its worst damage in the

larva stage, before it turns into a moth and takes to the air. The eggs are laid in the corn stalk by the previous generation, hatch out into the larvæ, and the latter begin to eat. They bore through the corn stalk until it is only a hollow shell, easily broken off by the wind.

Many of the worst insect pests we have, have been imported from abroad. Ships and cargoes from overseas, or produce and cattle imported over the Mexican border have brought in the corn borer, the Japanese beetle, the San Jose scale, gypsy moth and browntail moth, cotton boll weevil and pink bollworm, alfalfa weevil in the west and the Mexican bean beetle which has reached eastern bean fields.

Despite the work being done not only here but abroad to combat injurious pests, these classes of insects are actually on the increase, according to L. O. Howard, chief of the bureau of entomology. Insects annually cause a loss in the United States of \$2,000,000,000, he says.

Where the insect pests come from, and why and how they become so closely associated with one particular crop that they



Some of America's Imported Pests, against Which the Agricultural Department Wages a Steady Fight to Prevent Their Turning American Farms into an Unproductive Desert

threaten to destroy it, is an interesting story. The early pioneers in the west found that what the drouth did not destroy often would be eaten up by the native grasshoppers or chinch bugs, while the Hessian fly would destroy the wheat over large areas. When they turned to fruit, the native borers, or curculio, and the imported codling moth took a hand. As commerce abroad grew, more pests kept coming in, and other native insects which had been raised on wild plants developed a taste for cultivated fields.

Mr. Howard traces the advent of the corn borer back twelve years. His bureau has been working ever since it first appeared to find a means of controlling and eventually eradicating it. Because it feeds within the stalk and ears, it cannot be reached by the usual sprayed poisons. The only satisfactory method yet found is a change in farming practice. For seven months of the year, the borer lives in the caterpillar stage in the corn stalk. Farmers have been in the habit of cutting the stalks some distance above the ground, or leaving them in the field all winter after picking the corn, the stalks to be plowed under in the spring to enrich the ground.

If all stalks are destroyed in the fall, by gathering and burning them, all the borers they contain will be effectively wiped out, Mr. Howard says. As an alternative they can be cut off at the ground level and placed in silos to be used as cattle feed.

The insects of the world present an enormous problem for study. Entomologists estimate that there probably are at least 5,000,000 different species, of which only 600,000 kinds have been classified and studied. Many of them are harmless, and

many can be turned to good account by being used to prey on the harmful species. Experts of the government are continually searching the world for new species which are harmless in themselves but can be used to attack others that are not wanted. It was in this way that the parasitic enemy of the corn borer was found in France.

Fascinating stories of the lives of minute insects are constantly being unearthed in the studies of entomologists all over the world. Prof. J. Arthur Thompson, regius professor of natural history at Aberdeen university, in Scotland, tells of the common house gnat, which has been using a short-wave broadcasting set and a very sensitive directional receiver for ages before men invented radio and the loop aerial.

Mrs. Gnat, though only a fifth of an inch in length, can broadcast signals for Mr. Gnat to pick up. She employs tiny and tightly stretched membranes over some of her breathing tubes, vibrating them at a very high rate so that they emit a shrill sound, entirely distinct from the usual buzzing sound made by the rapid vibration of the gnat's wings. The male gnat has a pair of sensitive antennæ which act as a directional loop. He maneuvers until the sound made by his mate comes in with equal distinctness on both antennæ, and then flies directly toward the sound. If he gets off his course, he has only to hover for an instant while he "tunes in" again.

Experiments made with a tuning fork adjusted to the exact pitch of the female gnat's signal showed that the males were attracted in swarms, proving it is the sound and not any sight of the mate that guides them.

The insect world is full of marvels even

more interesting. People have to learn nearly everything in life, for only the most elemental cravings are born in them, but the insects, animals and birds are born as master builders, engineers, weavers, often producing structures so mathematically perfect—as is the bee's honeycomb cell—that it taxes the ingenuity of man even to duplicate it. Yet their knowledge is wholly instinctive, for all members of a given species are inclined to build their homes exactly alike, regardless of whether the design is suited to the surroundings to which they may be transplanted. It is only in the higher animals, like the fox, that an ability to adjust the plan to the surroundings is developed.

In British Guiana, on the northeast coast of South America, there is a whole cycle of life concentrated in the stem of the leaf of a tree, three kinds of insects living there in harmony, and all dependent on each other for success.

First a queen ant gnaws her way into the stem to find a nest for her eggs in the dried-up, fluffy pith inside. The worker ants hatch out and open the door, which the queen has made, so they can go and come about their business. Then a brood of mealy bugs appear, attracted by the dried pith, which is their favorite food. Whether the mealy bugs come of their own ac-

cord or are brought in by the ants, scientists have never been able to learn, but the latter is quite possible, for the bug eats more than it needs, and the ants proceed to use it as a cow, "milking" the bug to get the excess. The milking process is unusual. The ants gather around the overfed beetle and begin to thump it on the back, according to Prof. J. Arthur Thompson, who has



Automobile Spraying Apparatus Developed to Save the Orchards of California from the Inroads of Destructive Parasites That Have Been Brought Here from Abroad



Three Examples of What the Corn Borer Does to One of America's Great Staple Crops if Left Alone

described the process in his book "The New Natural History." As the pounding continues, the bug gives up a drop of sap, which is eaten by the ants. Then the thumping is resumed until another drop is obtained, a process that may take as much as half an hour.

Pretty soon a third boarder arrives in the leaf stem, a pair of small, slender, dark-brown beetles. They set up house-keeping and join the ants in milking the cow bugs. To earn their keep, the beetles erect a small round tower at the entrance to the leaf stalk, and here one is always on guard duty, ready to repel invasion or sound the alarm. As the beetles multiply, the mealy bugs increase in about the same ratio, so that there is usually a cow for every young beetle. Everybody appears to get something out of the apartment-house crowding except the mealy bug, but, as a matter of fact, it is one of the chief beneficiaries, for it has to get to the food inside to live, and, being unable to make an entry for itself, it is dependent on the ants and beetles whose slave it afterward becomes.

Another insect nature has fitted, in an unusual way, to cope with the problems of life, is the ant lion, which is really the larva stage of a rather large-winged and night-flying fly. When full-grown, the ant lion is about half an inch in length. As it emerges from the egg, however, it is a much smaller edition of what it eventually will be, just a little creature a twelfth of an inch in length. Despite its smallness, it immediately proceeds to earn its name

of lion, for it sets to work to burrow a pit and then sits down in the bottom to wait for a much larger ant to tumble in and furnish a meal.

The burrowing process is unusual. The ant lion always moves backward in a spiral course. When it finds a dry sandy place suitable for a home it starts to burrow, moving backward in concentric circles. The earth plowed up by its tail is shifted on top of its head, and then thrown clear by a

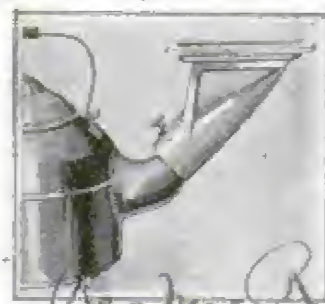
series of explosive upward jerks. Going round and round, the ant gradually digs a deep and steeply walled cone and takes its place at the bottom.

When food tumbles in and tries to claw its way out, the ant lion begins to throw particles of sand at the invader until it is swept off its feet and carried to the bottom—seemingly a case of unusual intelligence. As a matter of fact, scientists, according to Prof. Thompson, have decided that whenever a particle of sand lights on the ant lion's head it automatically gives an explosive jerk and hurls it upward and away; just as it does in digging its trap. So when the intruder tries to climb out and knocks sand particles down on the ant's head, the latter hurls them upward—not at the insect trying to escape but all around the cone—and some of the sand eventually sweeps the "meal" off its feet and down to the waiting ant lion.

TEAKETTLE STEAM IS USED TO RENOVATE CLOTHES

Easily attached to the spout of the teakettle, a flat-topped chamber makes use of the steam to renovate and iron ties, dresses and other articles. The gar-

ment to be treated is drawn over the steamer with slight pressure to crease it, the vapor reaching all parts of the fabric.



J. R. Horton
1214 Clay Ave.

QUEER FRENCH CLOCKS CELEBRATE WORLD WAR

Three of M. Boulat's Unusual Clocks; That of the Allies, at Left, the Branch Clock, at Right, and the Fantastic Heaven Below



M. Boulat, a French clockmaker with a taste for the fantastic, has become noted for his unusual timepieces. One, which he calls "L'Horloge des Allies," or the "Clock of the Allies," has a small figure representing a German soldier, caught by the seat of his trousers. Once an hour, while figures representing the allied generals look on, the mechanism winds up a string attached to the German, and then releases him, to fall into a vat labeled "sauerkraut." Another queer clock conception shows a globe studded with stars, and a large sun, the latter bearing the clock face. At the top of the globe is a happy-faced moon representing the German ex-kaiser. A comet, which represents Marshal Foch and is traveling around the rim of the globe, knocks the kaiser off his perch, and he disappears behind the clock, to reappear at the bottom as a sad-faced moon, when the operation is repeated. Still a third one, which he has named the "Branch clock," is constructed

of parts made from a single tree branch and a spool of thread, wound up around a framework so that it resembles a loop aerial for a radio receiver. Even the gong on which the hours are struck by a wooden

mallet is carved out of the same kind of material.

HUNT MYSTERIOUS BLUE GOOSE IN NORTHERN WATERS

Search for the little-known blue goose, and study of other birds that frequent the north, are objectives of an expedition of scientists who have fitted up a fifty-three-foot schooner for a stay of several months among the fastnesses of northern Labrador and Baffin bay. The explorers hope to find specimens for further observation and study. Among other things, they have taken 10,000 non-rusting tags or bands to place on birds captured, so that their wanderings may be recorded.

Headed by Dr. Ulrich
O. Austin Tuckerhoe

Boston Traveler 5/21/27

2651 CAVELIKE GROTTO CATCHES OLD-WORLD CHARM



One of the Rock Stairways, Upper Left; the Entrance Drive with Its Orange-Tree Bays, Right; a Courtyard, Two Stories Underground, with a Lemon Tree in the Center, and One of the Stairways

A sixty-room underground grotto, modeled after the semi-cave dwellings of southern Italian hillsides, has been constructed by a transplanted Italian in southern California. A portion of the structure is used as a public cafe and the rest as a residence, while the builder's plans call for an eventual addition of over 100 more rooms. The semi-cave construction lends itself to endless expansion, since there is no exterior form to be pre-

served and chambers can be added indefinitely without spoiling the appearance. Rock and cement stairways, arched doorways, quaint courtyards, in which lemon and orange trees grow far below the normal surface, pools and fountains, are among the features. The sloping entrance way, down which automobiles can drive, is flanked by a series of bays, in each of which an orange tree flourishes. The bays are cut back fifteen feet from the drive-

Baldysan Grotto, near Fresno.

way and so sloped that they will absorb all the water that enters the drive even in the hardest storm, preventing the streams from running down into the apartments.

SCHOOL FOR NIGHT WATCHMEN TO HELP PREVENT FIRES 282

More than sixty per cent of the time, or about eight months of the year, millions of dollars worth of property in the United States is under the sole care of watchmen. Surveys have shown that many of these men do not know how to turn in fire alarms, do not know the location of stand pipes and valves and have little knowledge of what to do in case of a fire or theft emergency. To improve these conditions, a training school for watchmen is to be opened in Chicago this September under the supervision of the fire underwriters and Frank C. McAuliffe, chief of the fire-insurance patrols. It will be of six weeks' duration, the courses given including special instruction on fire prevention, sprinkler equipment, automatic and other fire-alarm apparatus and general duties of a watchman. One morning each week will be devoted to the lessons, and at the end of the training, students will be given diplomas certifying to their preparation, provided they pass the final examination. The instruction is free. Already more than 100 men have been enrolled for the school and a corps of experts enlisted as teachers.

FLAVOR COAT FOR CREAM CONE LATEST SUNDAE NOVELTY 2549

Ice-cream cones are converted into sundaes with the aid of a simple unit that spreads a coating of fruit or other flavor inside the cone before the cream is introduced. The machine holds two quarts of liquid flavoring, is simple to operate and, when not in use, is tightly covered to protect the contents. The sirup is thick enough to prevent saturating and breaking the cone.



National Cone Sundae Co.,
1615
Spermon Ave.



Earphones in This Rubber Suit Permitted the Swimmer to Listen to Programs While under Water

BATHER HEARS RADIO PROGRAM BY EARPHONES IN SUIT

Radio fans who want to enjoy programs while swimming, may be able to do so while under the water, with the aid of an earphone-equipped rubber suit recently tested. A swimmer wearing it, listened in as a radio dialogue was in progress between a diver and an occupant of an airplane not long ago. The earphones of the suit were plugged into the diver's receiving set, and a long extension cord permitted the wearer free movements.

ALUMINUM STREET CAR QUIETER AND SAVES POWER 2821

Following a test of six months, Cleveland traction officials have reported that the aluminum street car is quieter than the usual kind and operates at a saving of about twenty per cent in power. It weighs but fifteen tons as compared with the twenty-one tons of the usual steel type. The decrease in noise is due to the fact that aluminum is not as good a conductor of sound as steel. Resistance to wear also was satisfactory, officials reported.

Cleveland Railway Co.
Cleveland, Ohio - and Aluminum

Company of America.

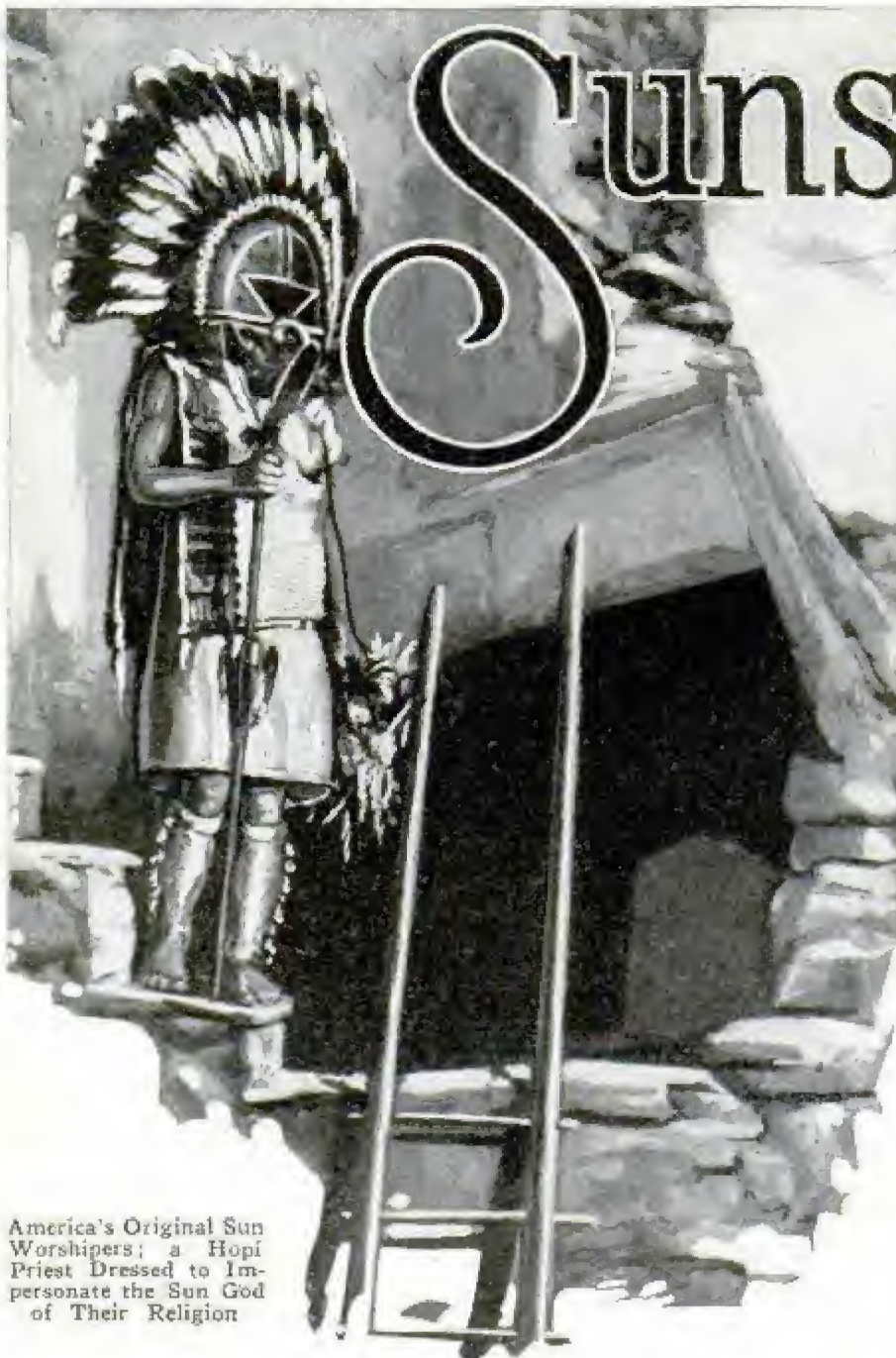
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miller

Letto Kemmer

Sunshine



America's Original Sun Worshipers; a Hopi Priest Dressed to Impersonate the Sun God of Their Religion

ONE of the world's oldest religions, sun worship, is being revived again, not as a religious belief, but because of new discoveries of the part the sun plays in maintaining health, life and happiness.

Without sunlight children would waste away with the bone disease rickets, followed by tuberculosis; adults would be pale and weak and subject to colds and pneumonia, animal life could not be maintained and even the plants would turn sickly-pale and wither away.

It is remarkable that it took so many centuries to interest men in the light that protects them against so many evils. What is sunlight? From sunrise to sunset the earth is being bombarded by a limitless

stream of invisible waves. They cover a wide range of sizes, just as their companion radio waves vary in size. A small part of the sunlight waves, when they enter the earth's atmosphere, become visible to the eye. Below the visible band, and also above it, shading off into ultraviolet at one end and infrared or heat waves at the other, are other waves which the eye, unaided, cannot see. All of them are moving through space at the same rate, roughly 186,000 miles a second, so the very short waves of ultraviolet are much more frequent than the long infrared waves.

The discovery by science that some of the visible waves at the violet end of the spectrum and more of the invisible ultraviolet rays beyond the realm that the eye can see are capable of making the bones develop, furnishing the green in grow-

ing plants, causing tan, and also sunburn, and protecting against colds and the weaknesses that make one susceptible to many diseases, is responsible for the growing popularity of the sun. Once the therapeutic or healing waves were isolated, science soon produced an artificial light to provide them whether the sun shines or not, and from that it was but a step to the latest-model lights, the power of which can be varied at will to give sunlight or double or triple sunlight, so that the equivalent to an hour or an hour and a half on the beach can be had in thirty minutes or less under the light.

The discovery that ordinary window glass stops practically all of the health-

What Is It?

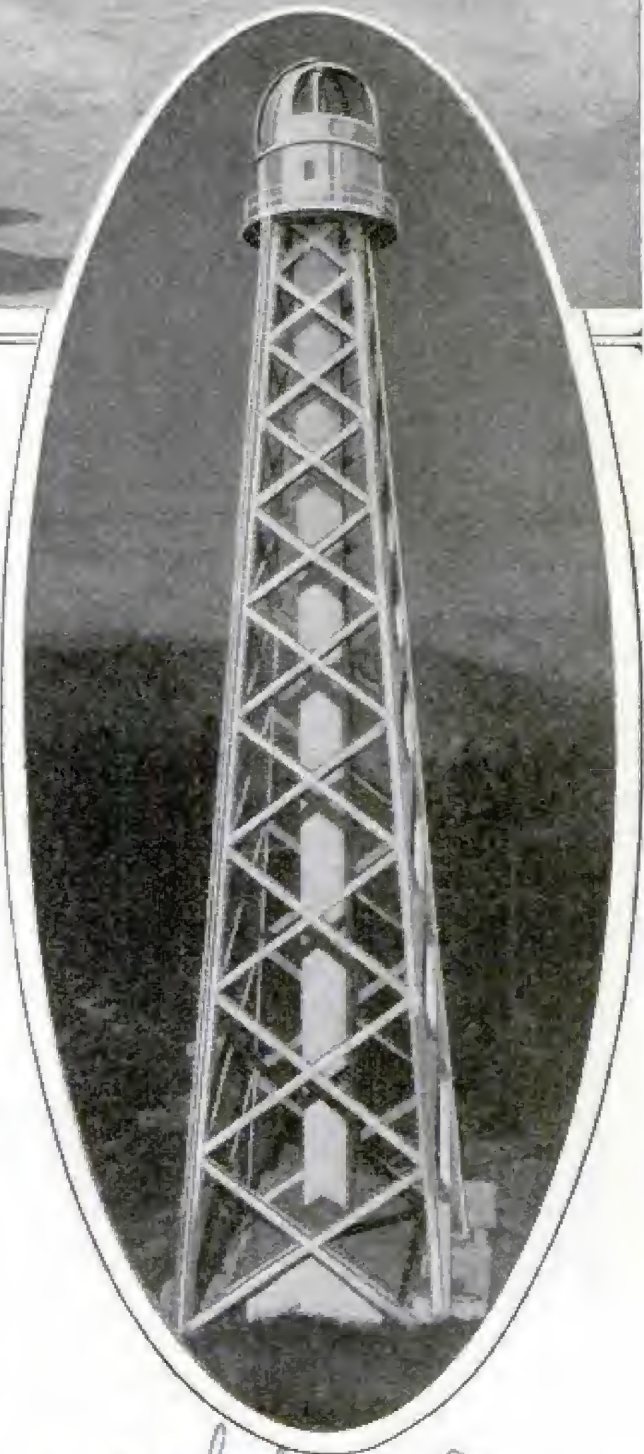


Sun Bathers Getting Tanned amid the Snow of the High Alps, and Solar Telescope at Mount Wilson, Calif.

giving rays and passes only the visible light, was one of the biggest scientific surprises in many years. The electric-furnace production of quartz glass, however, solved the difficulty, by making quartz windows and quartz globes for mercury-vapor lights possible. One drawback, however, of the quartz lamps has been that the powerful ultraviolet rays emitted from the mercury lights were so strong that they could only be administered under medical supervision to patients with their eyes carefully shielded by goggles, to prevent blindness and excessive sunburn.

A new type of light has been developed, however, and is now in the experimental stage, which produces the healing rays with practically none of the burning ones, so that long exposure will give a coat of tan without bad sunburn, and will not endanger the eyes.

The growing sunshine worship has led to keen rivalry between cities with the maximum amount of annual bright days. In England daily measurements of the ultraviolet radiation are made and published in the newspapers of several cities, along with the more familiar weather statistics, such as rain and temperature. In this



Will be put on market 1928
Liebel - Glaserheim Co
415 - 7th Ave - St

country several cities which are especially well situated to offer the maximum amount of health rays are advertising it widely.

While doctors and health seekers are attempting to utilize both natural and artificial sunshine, scientists are continuing the search of its properties so that the world will know all possible about it. Instruments have been developed to take it

apart and measure the amount of red, green, blue and violet light it contains.

The task of investigating all the different constituents and phases of sunshine is a gigantic one, and has been tackled in earnest only within the last few years. At the present time a number of specialists are devoting themselves to particular problems in this field. Thus a well-known Polish meteorologist, Dr. L. Gorczynski, has spent several years in traveling to various parts of the world for the sole purpose of studying the relative proportions of light of different colors in the visible part of the solar spectrum. He uses glass filters to isolate the rays of a particular color, and one of the discoveries he has made is that as one travels from middle latitudes toward the equator one finds a progressive decrease in the proportion of red to other colors in the composition of sunlight, and an increase in the proportion of violet. We may have here a clue to some of the effects of tropical climate on human health. These effects cannot be due to heat alone, since the highest temperatures in the world do not occur in the tropics, but in parts of the temperate zone.



Tubercular Patients Taking the Sun Cure in the Alps, and, Above, a Model Showing the Amount of Soot That Falls Each Minute in London, in Comparison with a Man on the Same Scale



Weather Bureau Observer at the American University, Washington, D. C., Measuring Solar Radiation, as Well as the Ultraviolet Rays That Reach the Earth from the Sun

The study of ultraviolet radiation has attracted a great deal of attention, on account of the effects of such radiation in curing various ailments. The sun cure, as carried out with great success at Davos, Leysin and other places in the Alps, depends chiefly upon the richness of the sunshine at these high mountain resorts in ultraviolet rays. Even at places near sea level, the proportion of these rays in sunlight and daylight is supposed by many authorities to be an important factor in promoting health. The campaign that has been waged so long against the smoke nuisance has received a new impetus from the desire to secure an atmosphere more transparent to ultraviolet.

The measurements made have disclosed a number of interesting facts. It is found, for example, that the amount of ultraviolet received from the sun does not run parallel with the annual variation of temperature. Far less ultraviolet is received in the spring than in the autumn. It has even been suggested that the deficiency of spring sunshine in these rays may account for "spring fever." Another curious fact about ultraviolet is that a much larger proportion of it is found in the light reflected from the sky than in direct sunlight. Hence heliotherapy, which depends upon these rays, can be carried out in the shade on

sunny days, and even on cloudy days in the atmosphere of the Alpine health resorts. Lastly, the Mount Wilson observers report an increase in ultraviolet with an increase in the number of spots on the sun.

In the United States, the latest practical development in the study of solar radiation is the campaign of daylight measurements undertaken in several cities under the auspices of the public health service. This service has adopted an elaborate form of daylight recorder, which traces on a moving sheet of paper a complete record of the intensity of daylight minute by minute throughout the day. The record for each day is from three to four feet long. The recording pen is controlled by a varying electric current generated by a photo-electric cell exposed out of doors to sunlight and daylight. This cell is a highly exhausted vacuum tube within which are two electrodes, one of these being an aluminum plate coated with a form of barium that is peculiarly sensitive to the action of light. The service has one of these instruments in operation in Washington and two in New York; one of the latter being on top of the U. S. marine hospital in the lower part of Manhattan, where there is usually much smoke and dust, while the other is at the quarantine station on Hoffman island in the lower bay, where the air



Artificial Ultraviolet Rays Have Increased the Laying Capacity of Hens. So These Experimenters Are Trying the Same System on Queen Honey Bees

is normally clear. The national conference board on sanitation is installing similar instruments in other parts of New York City, so that a comprehensive survey of New York's daylight will soon be in progress.

In the background of all these undertakings in the measurement of sunshine at

the earth's surface, as affected by varying conditions in the atmosphere, is the fundamental problem of measuring the actual amount of radiation sent to us across the gulfs of space from the sun. This is the great task with which the astrophysical observatory of the Smithsonian Institution has been identified for many years. The director of that observatory, Dr. C. G. Abbot, recently returned from a 30,000-mile journey taken for the purpose of selecting a site for a new "solar constant" station. This station has now been opened on the

summit of Mount Brukkaros, in arid southwest Africa, and is one of three stations maintained by the Smithsonian for making daily measures of the misnamed solar constant of radiation, which is actually subject to marked fluctuations. The other two are located on mountain tops in California and Chile.

EIGHT-MILE MODEL RAILWAY SERVES ENGLISH PORTS

Nearing completion in the south of England is an interesting miniature railway, eight and one-half miles long, between the old towns of Romney and Hythe. It is double-tracked, has a gauge of fifteen inches and, while much smaller than the standard lines, will be operated in up-to-date fashion with a system of block-signaling and other methods typical of the modern railroad. The engines are four and one-half feet high and weigh, with water and coal, about seven

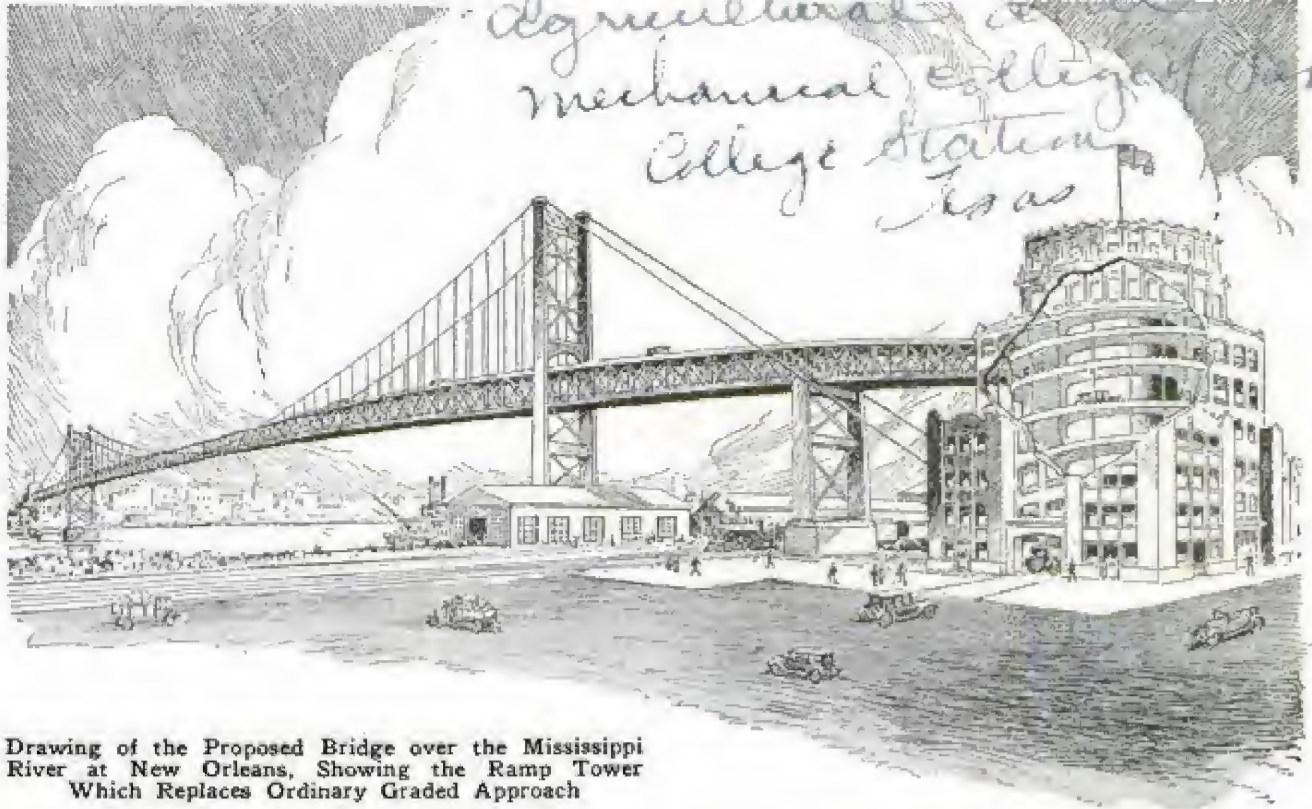
and one-half tons each. They can develop a speed of twenty-five miles an hour. Eight in all are required for the line, five passenger, two freight and one switching locomotive, together with sixty cars.



Nearly as Small as a Toy, but Built for Service; One of the Locomotives of Model Railway on Turntable

255/ Cont. A. Q. Bell, 3 Amen Corner,
London E.C.4. England.

*Agricultural Engineer,
Agricultural and
Mechanical College, Texas
College Station
Texas*



Drawing of the Proposed Bridge over the Mississippi River at New Orleans, Showing the Ramp Tower Which Replaces Ordinary Graded Approach

DOUBLE-SPIRAL BRIDGE RAMP TO REDUCE COST

Solution of the approach problem for the proposed bridge over the Mississippi river at New Orleans has been offered in double-spiral ramps at each end of the structure. They will save space and greatly reduce the expense of the bridge, engineers estimate, each being about 300 feet in diameter and about 120 feet high. The ramp roadways will be twenty-five feet wide and have a three and one-half per cent grade. Different ways will be provided for vehicles going on or off the bridge. It is expected that the entire structure will cost approximately \$10,000,000. The main span will be 1,650 feet long with two approaching spans, each of 800 feet. Several thousand automobiles will be accommodated each hour.

RACING IN EGGSHELLS 2825

Eight of the strongest athletes, more than half a ton of them, usually are picked for the rowing crews who race in craft so fragile they could be punctured with a finger thrust. Speeds are made that were considered impossible a few years ago, due to improved training methods, and better craft and oars. Harvard beat Yale re-

Paddock

cently largely because of a second's loss of time by Yale's crew near the finish, when a stroke was missed. Every instant counts in this exciting four-mile race, which requires twenty minutes or more of the most strenuous physical exertion the human body is capable of. Latest training stunts involve measuring the actual force of a stroke in terms of pounds and horsepower, and timing the strokes with clocklike precision at so many per minute.

VAPORIZER FITS LIGHT BULB TO KILL MOTHS 2631



43.50 Easily installed in the wardrobe or closet, a vaporizing outfit, operated with current from a lighting socket, is said to be effective in eradicating moths. A chemical, placed in a small basin, is vaporized by the heated bulb and permeates the clothing so that six hours' treatment assures thorough work, no matter how deeply the eggs or larvæ may be imbedded in the fabrics.

*J. L. Friedel Co,
215 Wallace St*

Moth X. Thermo.

494 FORTY-FIVE-DAY MASTER CLOCK CORRECTS OWN ERRORS



Where the Time Is Controlled for a Big City Building, the Master Clock in the Metropolitan Life Offices

Nearly 250 small electrical clocks and a number of larger ones in the Metropolitan Life Insurance company building in New York are controlled by a single master instrument. It, in turn, is regulated by telegraphy and automatically rectifies itself. It will run for forty-five days without adjustments of any description.

719 FIRST HANDKERCHIEFS IN CHINA WERE MADE OF PAPER

Silk and paper handkerchiefs were common in China long before the Christian era and, from this beginning, the article has had an interesting history. It first appeared among Anglo Saxons as a cloth worn at the belt to remove perspiration. Churchmen were the first to use handkerchiefs in Europe and, for a time, only priests were allowed to carry them. In the sixteenth century, it was not uncommon to mention the handkerchief in wills,

as the article had become highly prized, those of Holland, for instance, being fringed with gold and silver and made of costly silks. Lace trimmings also became fashionable although, for a time, the handkerchief was considered vulgar in French court circles until the Empress Josephine brought it again into favor. It is said that she habitually raised a lace-bordered kerchief to her lips when smiling to conceal her unsightly teeth. In the days of chivalry, the handkerchief was worn as a favor, and sometimes attached to the lance from which was derived the banneret or guidon now in common usage. Few accessories of dress have undergone so little change since early times as the handkerchief, which is essentially the same today as it was hundreds of years ago. In European cities, manufacture of the article is still a skilled handicraft, some handkerchiefs bringing large sums because of their excellent workmanship and materials. On the island of Malta, genuine Maltese silk handkerchiefs fringed with a deep border of lace can be purchased for \$5 each.

2095 FRICTION DRIVE GIVES DRILL EIGHTEEN SPEED CHANGES

A drilling machine with eighteen different speeds, made possible by the substitution of friction-drive disks for the usual belts and gears, is a distinct departure from the usual design. A direct-reading speed dial shows at a glance the speed at which the machine is operating. The drive is transmitted through a pile of fiber disks, tapered at eighteen degrees. The motor is mounted on the head of the column and furnishes the power through a single disk to the first pile, in the shape of an inverted cone. An intermediate disk, supported by an arm which also carries the speed counter, moves between the inverted cone and an upright one on the spindle head.



Joseph S. Myers & Son,
16th & Rockwell,
Chicago



Tree-Felling Contest in Australia; Each Ax Expert Was Required to Erect His Own Platform and the Cut Had to Be Made at Least Ten Feet from the Ground

AXMEN IN TREE-FELLING RACE FURNISH MANY THRILLS

Australia is known, among other things, for its skilled woodsmen and one of the features of an exhibition for the Duke and Duchess of York, during their recent visit to that country, was a race between axmen at Sydney. The men worked from platforms, planks braced against upright logs of the same size, and were each required to make the cut at least ten feet above the ground. The victor in the event illustrated here was the man at the left, farthest from the cam-

era. In addition to making the cuts in the shortest possible time, the contestants were also required to erect the platforms.

HOME MOVIE LESSONS IN GOLF LATEST AID TO PLAYER



Golf Lessons from the Home Movie

Slow-motion films of golf experts demonstrating a wide variety of strokes have been made for display on the home projectors. The pictures show how to hold the club correctly and make the proper swing. The student may follow the lesson with his own club, comparing his own performance with the expert's.

2535
220. Regent St. London
\$9 per lesson. 13 lessons
Ozell & Howell Co., 189-1
Larchmont Ave., Chicago.



Before the "Wild" Well Was Tamed; View of the Derrick as Reflected in Pool of Oil

TAMING WILD OIL WELL TESTS COURAGE OF WORKERS

Battling against gas fumes and deluges of flowing oil, workers replaced a valve that had blown off an oil well in Mexico, recently, after a week of strenuous effort. The difficulty of the undertaking may be imagined by comparing it with the task of putting on a water faucet knocked off a kitchen pipe, while all the gas jets in the stove are pouring forth gas. Multiplied several hundred times, the job might approach that involved in stopping the wild well. The valve weighed 500 pounds there was an eight-inch geyser of tarlike liquid and it was shooting out under several hundred pounds' pressure with asphyxiating gases. For a time, anchored airplanes were used in an effort to blow away the deadly flames, but, because of the fire hazard, they were abandoned.

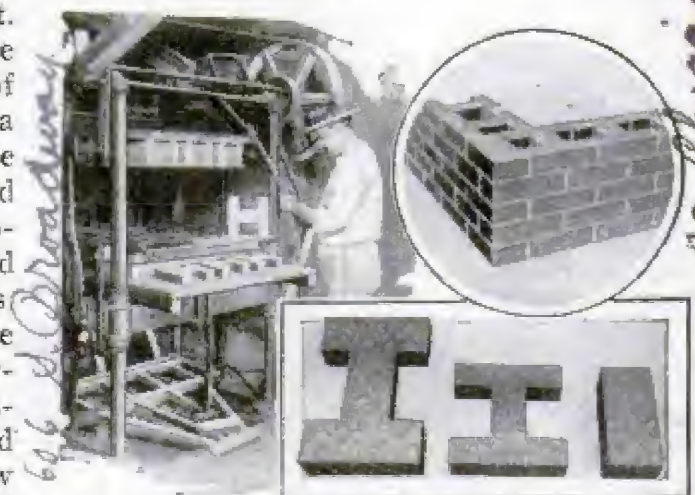
Crews worked in relays, with doctors in attendance to revive those who were overcome, until the valve was replaced and the big flow could be controlled.

AROMATIC UPHOLSTERY IN CAR 2704 IS GERM-PROOF

no data.
Odors of such common plants as cloves, thyme, wild verbena, geranium and cinnamon will protect automobile upholstery against germs, an English expert has discovered. Upholstery in which quantities of the plants have been mixed remains germ-proof for eighteen months to two years. He found that the odor of cloves would kill microbes in thirty-five minutes, while cinnamon killed some species in twelve minutes. The essence of cinnamon was fatal, he claims, to typhoid-fever bacteria after twelve minutes.

T-SHAPED BRICKS OF CONCRETE 2561 ARE EASILY MOLDED

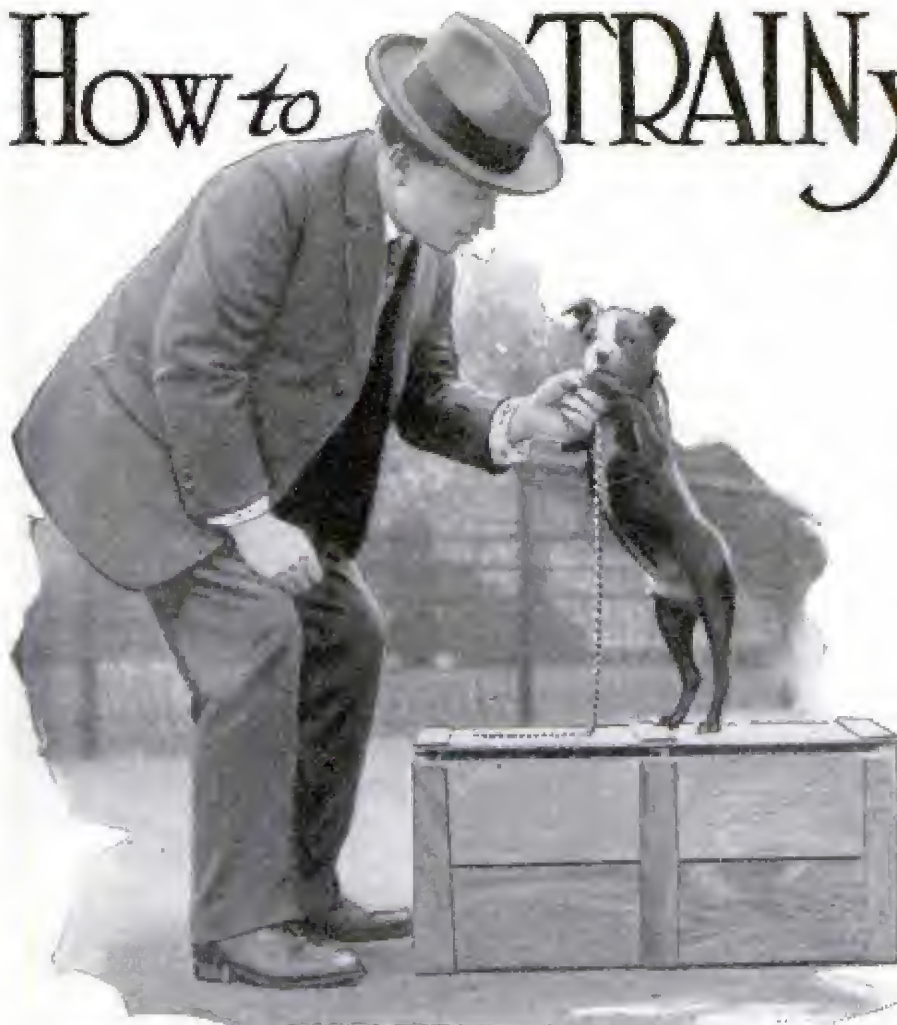
Strong bricks of concrete that closely resemble the usual variety are made in a recently patented molding machine, simple to operate and adaptable to large or small jobs. The units are shaped for quick and efficient laying and, when the materials are properly mixed, each brick has a compressive strength of more than 2,000 pounds to the square inch before crushing. Molds are automatically filled and the press is so arranged that ordinary-shaped brick, the T-forms for nine or thirteen-inch hollow walls, or a combination of the sizes may be produced at each operation of the press.



Brick Mold, Sample Wall Construction, and Three of the Bricks, Showing Shapes for Easy Laying

Haydenite Brick
Co. 403

How to TRAIN your PUP



Albert Parker, Superintendent of the Lincoln Park Zoo, with a Bull Pup Getting Its First Lesson in Walking on Its Hind Legs

By J. EARLE MILLER

CCAREFUL statistics have been kept in recent years of the thousands of people killed annually by automobiles, but how many pet dogs lose their lives through running out to bark and snap at passing cars no one knows.

A hunter who lost a valuable setter in this way, propounded the question of how to train a dog to break it of the habit. He received scores of answers. An English dog trainer described his method, which consists in tying the dog with a short leash attached to the radiator cap of a car, and then driving some distance, continually bumping the dog and forcing it to exert greater effort to keep ahead of the machine. Another suggestion was to take the dog out on a soft country road, have some one hold it down, with the tail outstretched, and then run over the tail with the car. The weight, on an unpaved road, will not hurt the dog much, but the fright, which can be accented by running the en-

gine in low gear, blowing the horn and making as much noise as possible, is sufficient to break the habit of chasing cars. The cure seems rather cruel, but it is better than letting the dog be killed or maimed for life. It is limited, however, to dogs with long tails.

Another suggestion, which has been successfully tried and which is suitable for any kind of dog, is to fill a garden syringe, used for spraying plants, with a mixture of water and ammonia and have a friend drive past in his car. As the dog runs out to snap at the machine the ammonia-water mixture is sprayed in its face. A couple of such experiences are suf-

ficient to effect a permanent cure, without injury to the pet. The owner's car should not be used, for the dog may associate it with its experience and be afraid to ride in it thereafter.

Training dogs is not a hard task, even to teach them complicated trick stunts. Albert E. Parker, superintendent of the Lincoln Park Zoo, in Chicago, and an old-time circus and vaudeville trainer, declares that any bright dog can be taught to sit up in twenty minutes, and to stand up in not much longer. Long-legged wolfhounds and other large dogs, of course, are not very suitable for trick training, the best type being the short-legged and close-coupled little terriers, small bulldogs and similar species. In his zoo, where no particular effort is made to teach tricks, since the animals are there for exhibition purposes only, he has a deer that can stand up and even walk a bit on its hind legs, though it is then about seven feet tall; a goat that stands up at will, and several other animals equally gifted. Compared



Parker with "Blossom," a Trained Deer Which Stands Well Over Six Feet High, and, at Right, "Medina," a Year-Old Camel, Born in the Coliseum at Chicago, with Its Trainer

to them, the training of a pup is a simple matter.

A corner of a room is a good place to start teaching a dog stunts, though a regular training bracket, such as is used by professional trainers, is still better. The bracket is simply two boards fastened together at right angles to form an angle in which the animal can sit up. They should be attached to the floor to prevent their being shoved around. The dog is backed into the corner, taught to sit down, and then, by lifting its front feet, is shown how to sit up. The teaching should only be carried out in a quiet place, where there is nothing to distract the dog's attention, and it goes better before a meal than after the dog is well fed, for then the brain is sluggish and the animal prefers to lie down in a warm spot and nap.

To succeed, the trainer must keep his temper, not shout, never grow angry, but gently and firmly make the dog do the de-

sired things. After the dog is backed into the corner or the angle of the training bracket, a hand is placed on its back and pressure applied, accompanied by the order to "sit down," emphasizing the last word until the pup associates it with the action. No further step should be attempted until the dog has mastered the order to sit down and will do it on command without the hand being applied.

Once that is learned, the front paws are lifted and the pup raised to a sitting position. Watch the back legs to see that they are drawn up in the proper position for balancing, and not sprawled out so that the dog is resting only on its tail. Each time the dog is lifted, the movement is accompanied by the order to "sit up," again emphasizing the second word. A few trials should be sufficient to teach the dog to keep the position, provided the back feet are properly placed to afford balance. The bracket is then discarded and the free

hand used behind the dog's back, and after the balance is attained, the hand is removed so that the dog can sit alone.

From sitting up to standing up and walking is the next step, and one that is not much more difficult to teach, though it requires plenty of patience. A training ring, which may be a spare leather strap, is fitted around the dog's body just back of the front legs, and to the underside of the ring a leash is attached and led between the front legs, through the collar under the throat, and the end held in the right hand. Order the dog to sit up, then, pulling on the leash and accompanying the pull with the words, "stand up," draw the leash upward to raise the dog to its feet.

The animal's weight is supported by the ring around the body, and not by the collar, so there is no danger of partial choking, while the leash, passing through the collar, controls the head and keeps the dog from getting it down or turning it about from side to



side. A small whip, a ruler or a light stick in the free hand is tapped under the front paws to keep them up, or to provide a temporary rest, if necessary. The chief difficulty to be overcome is the tendency of the dog to keep its hind feet firmly planted in one place and drag them rather than take forward steps.

Don't pull the body forward and out of balance, but, speaking quietly and soothingly, urge the dog to walk, and at the same time tap one foot or the other with the whip or ruler to emphasize the command. Even the brightest dog doesn't learn the trick of balancing itself on the first attempt.

A supply of bits of candy or cubes of meat should be on hand so that, after each attempt, the dog can be rewarded, and learn to associate food with obeying or-

Using a Band around the Body with Leash under the Collar to Teach a Dog to Sit Up and to Walk on Its Hind Legs, and, in the Center, a Trained Goat



One Way of Breaking a Dog of the Automobile-Chasing Habit, Only to Be Tried on a Soft Unpaved Road

ders. The dog should never be slapped, whipped or shouted at, for the first two will make it fear training rather than enjoy it, and the last will only rattle it and keep its mind off the work.

All dog tricks are taught in essentially the same way. Only one thing is attempted at a time and no others started until that one is thoroughly learned; the dog is always rewarded with food or petted and praised after each attempt. The first step is always to force the dog through the trick, at the same time repeating the command over and over until the animal learns to associate the two. The second is to put it through the trick without force, but with assistance in lifting or balancing, if needed, until the dog learns to do the thing unaided, and finally it is put through the trick unaided until it has learned to do it on command.

Harness is used in many tricks as in standing on either the front or hind legs, but is always designed carefully so that it supports the weight without binding or alarming the animal.

"The chief thing," Parker declares, "is to train yourself first and the animal second. Before you can hope to master an animal you have to be master of your own temper, so that you never lose it, never become impatient, never try to hurry things along too fast. Any animal with an undeveloped mind can no more concentrate for a long period than a baby can. Lessons should always be brief, and should stop at the first sign that the animal's attention

has begun to waver. They should always be given in a quiet place, with no other animals or people about, and if possible with no disturbing sounds outside. A professional trainer never starves an animal into submission, for that only breaks its spirit, but he does exercise judgment in feeding periods so that they follow, and do not precede, the daily lessons. Similarly he teaches the animal to associate a reward with obedience."

Sitting, walking and other stunts should not be taught until the dog is old enough to keep its attention centered on the task.

ELECTRIC ICE-CREAM FREEZER ELIMINATES SALT AND ICE

One of the latest additions to the lunch-counter or refreshment stand is an electric ice-cream freezer which employs a circulating brine system and beater instead of salt and ice. It is said to have a



Freezing Ice Cream While You Wait; the Counter Outfit in Operation Showing Its Compact Size

capacity equal to freezers three times its size, is noiseless and can also be operated as a drink mixer. Space is provided in its cabinet for storing creams and fruits as well as for hardening ice cream to be taken away.

Taylor Freezer Corp.
11111 Niagara St.

Corpo.
Buffalo, N.Y.
General Refrigeration
c/o
Beloit, Wis.



Class of School Boys Qualifying to Become Professional Bakers; Schools in Several Cities Have Added Cooking Courses for Boys to the More Usual Types of Training

BOYS LEARN TO BAKE CAKES IN PUBLIC COOK SCHOOL

Cooking classes for boys are given in one of the public schools in Baltimore. Hundreds of boys are taught essential points in baking at a Chicago school and similar instruction is given in several others. Most pupils take the course with a view to becoming professional bakers.

MACHINE THAT MATCHES COLOR ELIMINATES GUESSWORK

Matching the delicate shades of fabrics and flowers has been reduced to an exact science in an apparatus developed at the Massachusetts institute of technology, promising great benefit to textile and other industries that make important use of color, and eliminating the factor of error when the task is left entirely to the human eye. The method involves the use of a photo-electric cell, a tungsten-filament lamp fifty times as bright as sunlight and a recording apparatus that makes a visible analysis of the color specimen. The sample is placed in a special holder and illuminated. Water filters are adjusted to prevent the sample from catching fire. Light

is alternately reflected from the specimen, and a portion of magnesium carbonate, the whitest substance known, is used as a standard of comparison. This reflected light acts upon a photo-electric cell in such a way that an alternating current is induced, is magnified through vacuum-tube amplifiers, and a record of the wavelengths produced on a moving drum by a pencil. The result is a description of the color which may be telegraphed across the country, if desired, for matching with another sample or for reproduction.

WHISTLE IS WORN AS A RING FOR INSTANT SERVICE

Slipped on the finger like a ring, a whistle is always in position for use, is less likely to be lost and eliminates bothersome chains. It is intended especially for postmen, policemen and referees, but is also useful to scoutmasters and teachers, as a plaything for children and would be serviceable to almost anyone in emergencies for summoning aid.



Prof. Charles P. Hardy & E. C. Petrie, 15 Moore
and Frederick Cunningham St. New York

WHY YOU CAN FAST FOR WEEKS AND STILL LIVE

2592 Why the human body can be deprived of food for days or weeks without serious or permanent injury is being studied at the Carnegie Institution in Washington in

health and then restored to good marketing condition by liberal feeding.

The tests with steers showed that the so-called "hunger feeling" was merely a temporary sensation caused by physical contraction of the alimentary tract to meet the requirements of a diminished bulk. In no sense, it was said, does it represent distress due to lack of nourishment or tissue, and, in fact, after the second day, the steers showed no particular craving for food.

In the experiments, the subjects were placed in airtight boxes, with a measured flow of air admitted through a blower,



experiments on men and animals, with the result that new facts about the problem of human nutrition have been disclosed.

Steers, dogs, white rats and men and women were subjected to the most exhaustive tests ever made, to discover exactly what the body does with the food consumed, and how it functions when food is withheld. Tests on 136 men and 103 women showed that every twenty-four hours the body of a man produced 925 calories of basal heat for each square meter of body surface, while the women averaged 850 calories each. Under practically the same conditions, the average steer burned up 1,300 calories a day, while the white rats were at the foot of the list with only 600 calories. It was demonstrated that steers can be carried through a period of several months on extraordinarily low rations without affecting their general



Measuring the Energy Consumed and Body Changes of a Man Chinning Himself and One Riding a Stationary Bicycle

while the used air, containing the chemicals, exuded both in the breath and through the body pores, was exhausted through a second blower and passed through chemicals to extract and measure the products of energy consumption.

SKINLESS FRANKFURTERS

"Hot dogs" without casings are being produced by a Maryland sausage maker who is said to have experimented fifteen years on the problem.

The Löffler Sausage Co.
Piquette, Md.

SAVINGS FROM RAILROAD JUNK TOTAL MILLIONS YEARLY

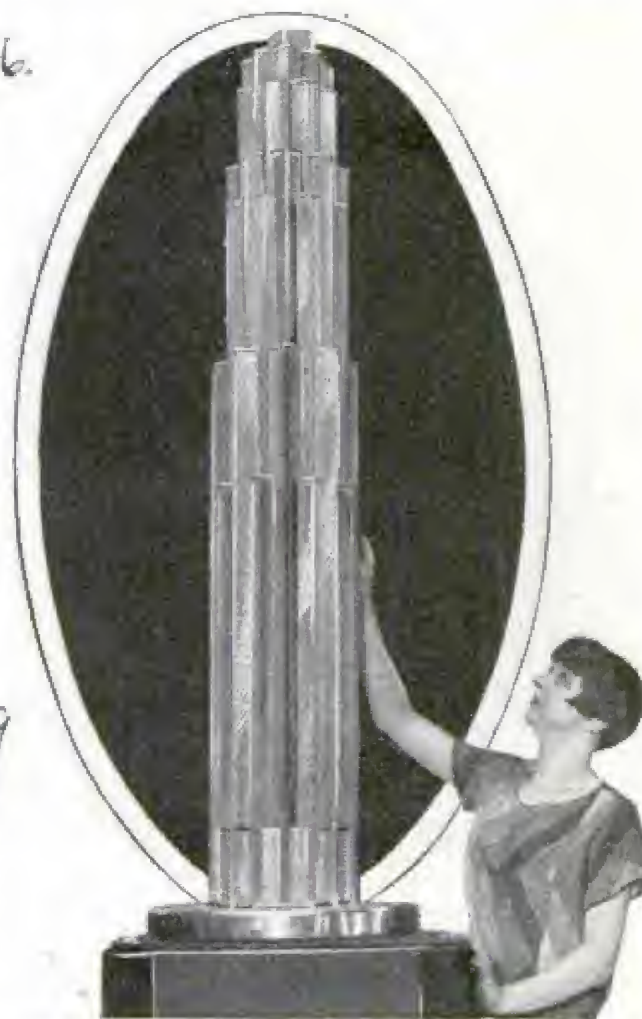
Once scorned by the American railroads, the junk pile is proving an important source of economy to the carriers, the intensive work of recovering, reclaiming and repairing discarded materials involving millions of dollars annually. A railroad needs practically everything from pins to locomotives. Purchasing agents buy approximately 60,000 separate and distinct items. The railways use twenty-five per cent of the steel produced in this country, twenty per cent of the lumber and twenty-eight per cent of the coal. The total purchase of materials and supplies approximates several billion dollars every year.

POLES OF FLEXIBLE CONCRETE FOR TROLLEY LINES

For use on trolley and electric transmission lines, concrete poles with a high degree of flexibility have been made by an interesting process developed at the Westinghouse plant in Milwaukee. The poles are spun in a horizontal position, a wet mixture of concrete being placed in a steel mold and the mold revolved at high speed. The centrifugal force throws the concrete against the mold and packs it well around the reinforcement, leaving a hollow opening extending the full length of the pole. Excess water and dust come to the center and are drained out through this opening, leaving an extremely well-packed and strong unit. Tests showed that, below the elastic limit of the steel reinforcing bars, the poles will return, upon release of the load, to within an inch of their original position. There was no break in the pole at the ultimate load, only a refusal of the pole to take further load and a slight opening of tension cracks as the steel is stressed beyond the elastic limit. Even after failure, the pole will take the same load in the opposite direction.



Reinforced-Concrete Telegraph Pole Bending in Tests from Which It Straightened Again



Model of a Skyscraper of the Future, Built Almost Entirely of Glass Sides and Steel Beams

MODEL OF GLASS SKYSCRAPER HINTS NEW BUILDING AGE

Not long ago, Hugh Ferriss, a New York architect, presented drawings to show the appearance of a skyscraper built of glass and steel. At a recent exhibition, he displayed a model based on his sketches. It showed a structure with walls almost entirely of glass and the weight supported mainly by steel girders at the center. Improved and cheaper methods of manufacture, the need of light in city streets and offices and the fact that glass can be made to admit the healthful rays of the sun, are factors favoring the use of the material for structural purposes, engineers say.

Machine Age Show

Westinghouse Electric & Mfg. Co.

The Army's GREATEST



One of the Many Medals Awarded Gen. Squier for His Inventive Work Improving Army Communications

By EMMET DOUGHERTY

A DOZEN empty spools plus a hundred feet of twine in the hands of a lad in Dryden, Mich., fifty years ago, were converted into complicated devices which operated with the slightest human urge.

Ten years thereafter, the deft hands and active mind of that youth had won him a commission in the United States army in which he had a distinguished career and from which he retired not long ago at his own request with the thanks of the government.

The man is Maj. Gen. George Owen Squier, war-time commander of the signal corps and air service of the government, the only American soldier who was ever made a member of the National Academy of Sciences, holder of two awards from the Franklin Institute for scientific discoveries, and distinguished by four governments for special praise.

"I was always tinkering around with spools and twine and a piece or two of wire if I could find any," Gen. Squier explained. "If I could turn a crank and see something that I made with my own hands

move, twist or vibrate or show the slightest animation, I felt I had invented something and was happy."

Gen. Squier has easily the most unusual record of any of the hundreds of skilled and expert men in the official personnel of the American army. His name is inseparably connected with the transmission of intelligence on land, under the sea and in the air. He was at the birth of two of the greatest inventions or discoveries of the world—the radio and the airplane—and during his active career in the army had charge of both and is responsible for improvements in each.

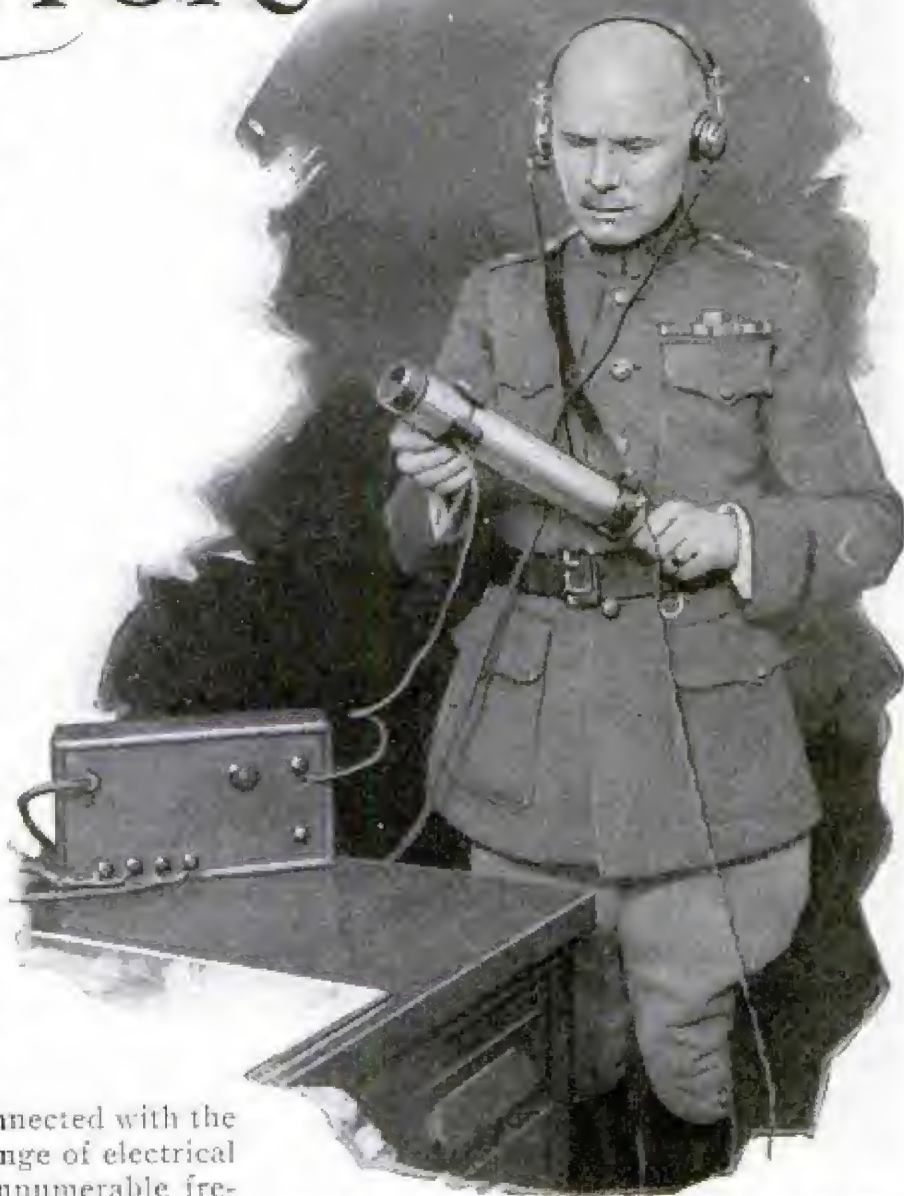
As a young officer in the artillery school at Fort Monroe, he was the instructor of future military geniuses of the army. During the Spanish-American war, he was press censor of the Haytian cable at New York, the connecting link between McKinley in the White House and Sampson at the front. He laid the cable connecting the west coast with the Philippines, commanding a ship at sea for two years in this task, which took him before the Sultan of Sulu and other notables to whom he described the magic of his "talking wires."

Gen. Squier attributes most of his inventive activity to the days he spent in the classroom at Johns Hopkins university at Baltimore, taking a post-graduate course in physics. His inventive mind found expression first while a second lieutenant as head of the department of electricity and mines at the artillery school at Fort Monroe. While studying the velocity of projectiles in 1894, Squier invented the polarizing photo-chronograph, an instrument of remarkable recording power. In measuring the velocity of projectiles, the time is recorded by sending the missile through screens which operate the device. This was followed by the synchronograph, a device for increasing the capacity of land

INVENTOR

telegraph wires. This invention marked a great step forward in the rapid transmission of intelligence. The active mind of young Squier then turned to conquering the mysteries of undersea transmission, inventing a dynamo that sent an unbroken alternating current over ocean cables, thus permitting uninterrupted use of the submerged telegraph line and almost doubling its capacity. One of Squier's first discoveries applied during the World war was the "tree wireless," a method of transmitting and receiving wireless messages by the use of growing trees as antennæ. In studying the absorption of electromagnetic waves by living vegetable organisms, Squier found that a metal rod driven into a tree is intimately connected with the earth and is subject to change of electrical tension representing the innumerable frequencies required by the modern radio telephone and telegraph, as well as other electrical disturbances. Applying his principle, American signal-corps officers at the front in France, by the simple device of driving a nail into a tree to which to connect the radio set that wireless operators use to magnify the dots and dashes, found it possible to "listen in" on wireless communications between flying German airplanes and instruments on the ground.

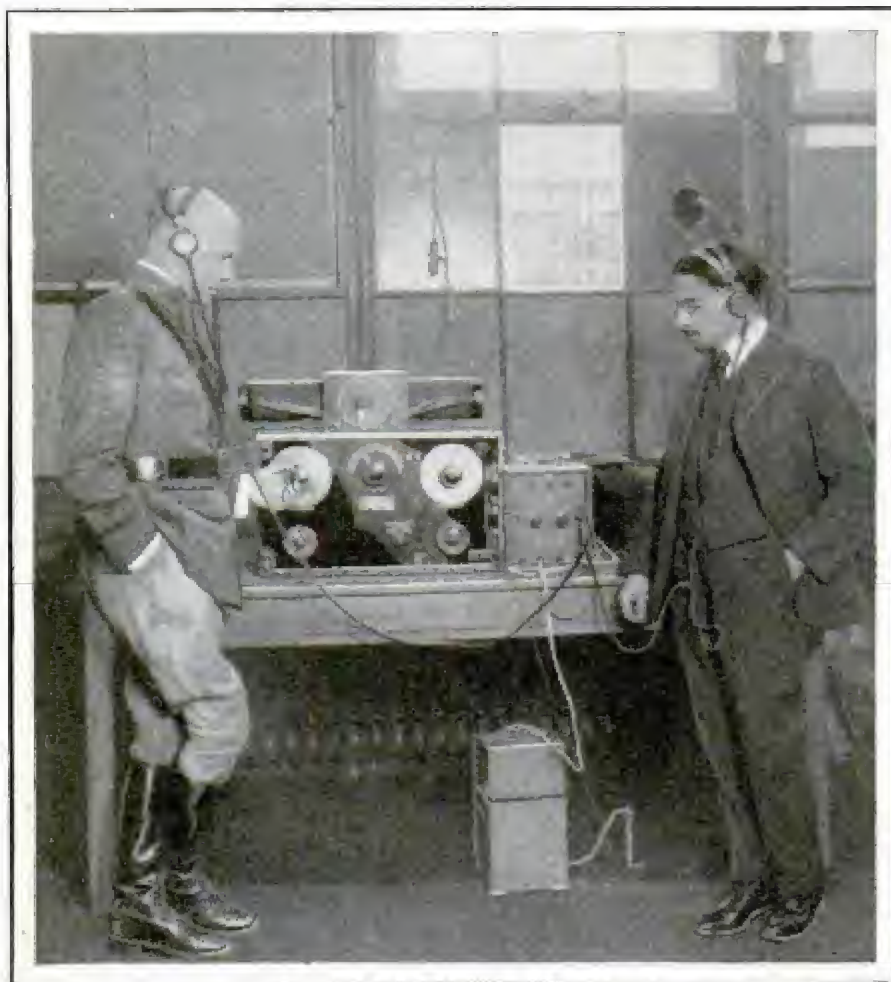
These inventions, however, were merely the beginning of a series of achievements by which he improved and advanced the methods of telegraphy and telephony, which won him that place in science where the Franklin Institute declared him entitled to the awards which it bestows. The



Gen. Squier in His Laboratory with Some of the Electrical Apparatus Which He Has Produced

capstone of his achievements, figured from the standpoint of the Franklin Institute, was declared to be "wired wireless" or multiplex telephony and telegraphy. On the occasion of presenting Gen. Squier with the Franklin medal, the institute made this reference to his discovery:

"The 'wired wireless,' first proposed by him in 1911, has proved, especially in military field operations during the war, to be invaluable as a means of sending intelligence and commands. As the name implies, it is a method of telegraphing or telephoning by means of electrical waves guided by wires. In this way as many as a half dozen messages may be sent along



The Army's Inventor with Louis Cohen, Consulting Radio Engineer, in His Private Laboratory in Washington, Where He Does Much of His Work

a telephone wire, but outside of it, at the same time, and without interfering with the use of the wire for ordinary service. The message, however, must be tuned to different frequencies and be received by separate receivers. One great advantage of this system is that the waves will still travel along the wire when it is broken and jump gaps in it of fifty feet and more."

Gen. Squier cannot be brought into a discussion of his part in the strenuous days of American war preparations, but he frankly boasts of that day in 1906 when Orville Wright came into his office in Washington with plans for an airplane.

"Orville Wright came in with his airplane all planned," he said, "and I was skeptical. 'Where is the gas bag to hold it up?' I asked. 'You can't stay up in that without gas.' Wright offered to demonstrate and we went over to Fort Myer, across the river from Washington, and the thing actually stayed in the air. I was the first passenger to ride in the ship, the flights of which caused congress to adjourn, to let the legislators see the mar-

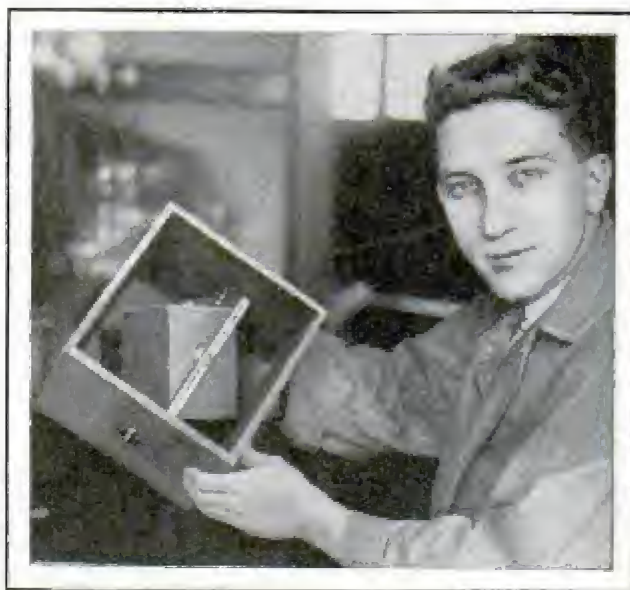
velous thing. Later Gen. Allen, then chief signal officer of the army, assigned me to the task of collaborating with Wright in designing the first heavier-than-air airplane for military use."

Gen. Squier therefore enjoys the distinction of being at the birth of two of the most creative things in the world—wireless or radio communication, and flying machines that actually did fly.

In addition to the Distinguished Service Medal bestowed on him by the United States government for his services, Gen. Squier possesses many decorations from foreign governments.

UNSPILLABLE BOX FOR LIQUIDS

One of the aids to international standardization tests of electric force is a special shipping container for a cell used in the grading work. It is a double box, the inner chamber being arranged so that it swings right side up at all times and the liquid content of the cell will not spill.



Built like the Mount of a Gyroscope, the Inner Box Remains Right Side Up All the Time

Bureau of Standards
2239

RAILROAD TO CROSS AUSTRALIA REPLACING CARAVANS

2602

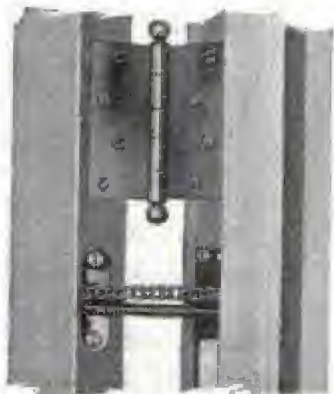
One of the most ambitious railway projects now under way in the world has been started in the construction of a line to close the gap between north and south Australia. It involves the building of about 1,000 miles of railroad and, when completed, will open up a wide territory as yet but little developed. It is now crossed only by a telegraph line and costly camel caravans that transport freight at an expense of about \$350 a ton on the 900-mile journey from Oodnadatta, the present northern terminal of the southern line. The finished railway, according to the National geographic society, will link Adelaide, in a latitude comparable to that of Memphis or Little Rock, with Darwin, Australia's tropical port, and is expected to stimulate agriculture, stock raising, mining and other industries.

INVISIBLE SPRING DOOR CLOSER HIDDEN IN FRAME

2486

Unsightly arms and brackets are eliminated in a door closer contained in a housing within the frame so that it cannot be seen when the door is shut. Two strong compression springs are the chief operating units of the device and speed control is afforded in a regulating valve.

The closer is not difficult to install and is especially adapted to use where schemes of interior decoration and other effects are marred by conspicuous door attachments.



WOOL FROM RABBITS

2660

Prized as pets in America, Angora rabbits are an important item of industry in France. They are raised on more than 1,000 farms for their wool, which, in some seasons, brings as much as \$8 a pound. In one year, the value of the total amount produced in France was \$190,000.



Leaning and Twisted like a Corkscrew, This German Church Steeple Still Stands

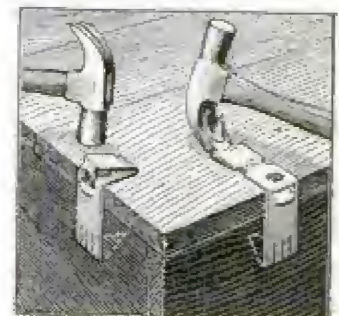
TWISTED AND LEANING STEEPLE RIVALS PISA'S TOWER

Lightning is believed to be responsible for the shape of a church steeple in Coblenz, Germany. It has been twisted like a corkscrew and also leans at a decided angle, but appears to be sturdy in spite of the displacement.

BOXES PROTECTED IN SHIPPING WITH SAFETY CLAMP

2430

Safe delivery of goods shipped in wooden containers is made more certain by using a special clamp for the lid of the box. It cannot be removed without permanent mutilation, while the receiver of the case can take off the clamps and not destroy the container. It is essentially a lock, a nail being driven through a hole in the clasp at the top and securing a bottom portion. A spiked flap of the clasp is then bent over and fixed into a slot to seal the nailhead.



New York City

C. A. Israhham

C. W. Newton & Co., 261 Franklin St. Boston

ONE-ARMED FISHERMAN'S BOAT STEERS WITH WHEEL

Loss of one arm does not prevent a Massachusetts man from boating and fishing.

Novel Fishing Boat with Paddle Wheels
Operated by Hand Lever, for Use of
One-Armed Man



He has designed a special craft for his own use with a wheel at the side that operates the rudder, and paddles manipulated by levers within easy reach.

JAPANESE STILL USING SAWS THAT CUT ON UPSTROKE

Saws and planes that are pulled toward the carpenter on the cutting stroke, instead of being pushed, continue to be used almost universally in Japan, despite the adoption by wood and metal workers of practically all other forms of American and European tools. Hammers, augers, bit braces, files, screwdrivers, twist drills, hacksaws, pliers, wrenches, taps and dies as well as other imported tools are sold throughout the islands by hardware dealers, but every attempt to introduce saws and planes has been a

failure. The Japanese saw is about the size and shape of a meat cleaver, and is unusual also because there are two saws combined in one, a rip saw on one edge and a crosscut saw on the other. The workman ordinarily stands on his work and uses the back muscles to pull the blade upward. The ordinary Japanese plane is a simple wooden block, with the blade held in place by a wedge. The blades usually are of soft iron. Japanese carpenters have several unusual tools in their kits. One is the "sumitsubo," which takes the place of the American chalk line, and in many ways is quite an improvement over the latter. It consists of a beautifully carved wooden reel, containing a silk line, which

is wound up by a small handle. When the line is drawn out it passes over an ink pad in a recess, so that, when it is snapped, it leaves a black mark. To use the sumitsubo, the carpenter draws out a few inches of line, sticks a pin through a loop in the end, pushes the pin into place in the plank to be marked, walks to the other end, allowing the line to reel out, and then snaps the line, making his mark. A companion piece to the sumitsubo is the "sumisashi," a piece of bamboo about seven

inches long. One end is cut to a rounded point and the other flattened to a thin chisel-like edge, about three-eighths of an inch wide. The thin edge is then split back with a dozen or more fine knife marks, so that it will hold a quantity of ink. The carpenter rubs the split end on the ink pad of the sumitsubo and uses it in lieu of a carpenters' pencil.



Three Japanese Tools; a Chalk-Line Substitute, a Bamboo Marking Pencil, and a Double-Edged Saw

TREATING THE WORLD'S BIGGEST ACHES AND PAINS



The Dentist's Drill Is Bad Enough, but the Zoo Tooth Doctor Uses a Large File on the Hippo's Tusks



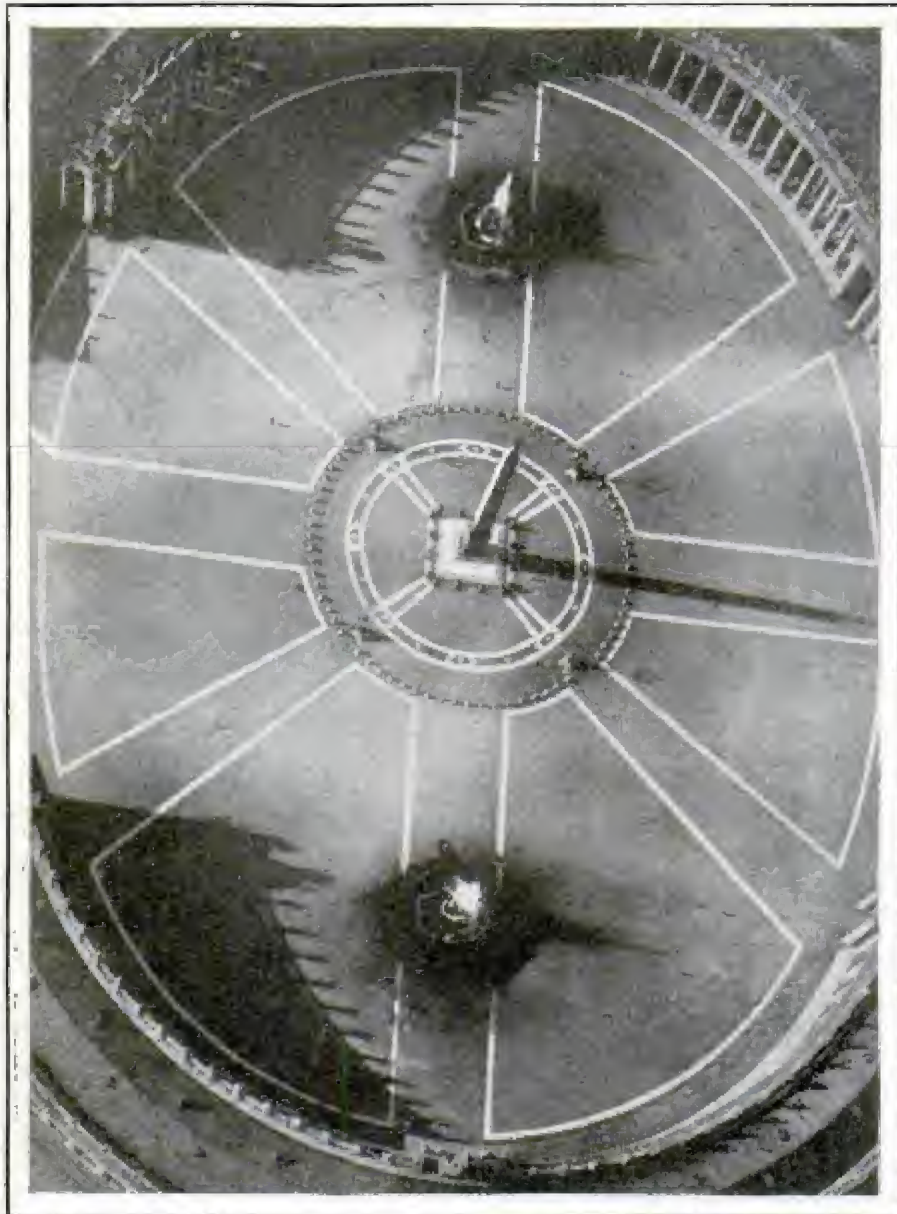
Some Doctors Render Big Bills and Others Treat Them; Meet the Pelican, Above, and the Toucan, Left, Taking Their Medicine

It Takes All Kinds of Manicurists to Make a World, Including the One Who Trims the Elephant's Toe Nails to Get It Ready to Be Admired by the Sunday Visitors to the Zoo

Philo



6/19/27



Giant Sundial of St. Peter's Square Registering the Time in Mid-Afternoon

SHADOW IN ST. PETER'S SQUARE TELLS TIME OF DAY

One of the most famous, and perhaps the largest, sundial in the world is that formed by St. Peter's square in Rome. The obelisk's shadow, falling on the marked circle, indicates the hours when the sun is sufficiently bright. When the accompanying photograph was taken, the time was a few minutes past three.

AIR PATROL OVER FOREST FIRES REDUCES TIMBER LOSSES

Army airplanes, playing much the same role in the warfare against forest fires as they do in military tactics, are patrolling the national timber stands this summer, enabling observers to guard large sections

and affording a means for quick action in case fires break out. Reserve officers, temporarily in the employ of the forest service, make special flights from several bases established in California, Oregon and Washington, especially after electrical storms, when there is a likelihood that fires may have been started from lightning. One of the interesting results of the air patrol is the effect it has on campers. Knowing that their fires are likely to be seen from the planes, they are displaying greater care in extinguishing their camp fires when they move, and there has been a marked falling off in the number of cases of incendiarism. Congress has appropriated \$50,000 for the patrol work and the planes cover huge territories in the national forests of the west. Besides gaining early knowledge of the fires, the flying patrolmen carry messages to forest rangers, food supplies to fire

fighters when they are combating blazes in otherwise inaccessible places, and the planes have been found useful in making timber surveys and studies of forest areas.

PORTABLE SAW DRIVEN BY AIR SAVES TIME AND WORK



Adapted to a wide variety of tasks where speed is essential, a portable air-driven saw now on the market has been found useful. It has replaceable blades for crosscut or rip work and special saws for cutting materials other than wood. A feature is the safety guard which

Safety first
Ingersoll-Rand Co.,
11 Broadway,

automatically covers the blade when the saw is lifted out, and there is also a convenient adjustment for regulating the depth of the cut.

HOUSES ARE BUILT ON RUNNERS FOR SMELT-FISHING 2640

Because a Boston man froze his ears and one foot while fishing for smelt in Maine one winter, sportsmen now have learned to tend their lines in comparative comfort, sheltered by little huts constructed on runners for quick and easy moving over the ice. Before the Bostonian's experience, the fishermen stayed in the open air, enduring the intense cold as best they could. But he had a heavy wooden frame constructed, covered it with sail canvas, leaving an opening for the door, placed the "house" over a hole in the ice and fished in luxury, warmed by a wood fire in a small stove. The idea was soon adopted and, before many seasons, similar huts appeared on nearly every estuary and tidal river where the fishing was conducted. When the day is right and the season good, an expert fisherman can catch sixty pounds in a day, and there is always a ready market. The tackle required is simple, a linen cord about four feet long, sinker, a small hook at the end of a two-foot snell attached to a swivel, and clam worms for bait. Usually four lines are operated to a hole. During the fishing season, whole villages may be seen on the ice.



Fishing Shed Mounted on Runners, So Horse Can Pull It to New Scenes,
Is Used by Winter Smelt Fishermen

WOMAN DARES DIZZY HEIGHTS CARVING WASHINGTON HEAD 2607



Woman Sculptress at Work, High above the Ground,
on Head of George Washington

Perched perilously on a scaffold, eighty feet high, Mrs. Harvey Wiley Corbett, a New York sculptress, assisted in finishing the massive bas-relief of Washington on the masonic national memorial at Alexandria, Va. The carving was made on a huge block of stone weighing seventeen tons, the head itself being four feet six inches from neck to crown. Mrs. Corbett rode on an improvised ladder and pulley hoist to reach the work, preferring that means

of ascent to the temporary stairway. The actual chiseling was done by G. Fred Coles, who executed the statue in the Lincoln memorial, from a plaster plaque molded by Mrs. Corbett. The task was slow, for many pauses had to be made to allow the stone to weather in order to judge the proper delineation of lines and shadows, while the cutting tools had to be renewed frequently because of the hardness of the material, Conway pink granite, in which the bas-relief was cut.

Bureau of Fisheries

Washington



Prohibition Agents X-Raying Bale of Hay, to Reveal Bottles of Liquor Hidden in Its Center

FIRE DAMP FOILED BY ELECTRIC COIL

2688
An electrical indicator to detect the presence of methane gas—the dreaded fire damp of the coal mines—has been developed and is hailed by engineers as the greatest advance in safety since Davy's mine lamp. The indicator is a tiny coil of platinum which is heated to a constant temperature by electricity. Under normal air conditions the temperature remains fixed, but any increase in the amount of methane causes the temperature to

rise, the increase being recorded on a dial in the mine office. An entire mine can be wired up with the indicators scattered through every passage, and the dials centered at one point, where any increase in the amount of gas can be detected long before it reaches dangerous proportions.

X-RAYS DISCOVER LIQUOR HIDDEN IN HAY BALE

X-rays have come to the aid of the dry sleuths in the form of a portable outfit for locating contraband hidden in shipments of various kinds. Not long ago, the apparatus led to the discovery of several cases of whiskey which had been concealed in bales of hay. The machine affords a fluoroscopic record of the materials inside.

TOMATO-CANNERY WASTE CUTS 9705 LAUNDRY BILLS

Tomato-cannery waste, formerly discarded, has been discovered to be worth 10 cents a gallon in Italy, where laundries now utilize it to remove stains from linen, particularly collars. The clothes are soaked in vats of the diluted cannery by-product for an hour, by which time the stains are so thoroughly loosened that they can be washed out with little soap and practically no rubbing.

TWO-TONE BANJO HAS DAMPER TO REGULATE SOUND

Two distinct tones are said to be produced by a banjo recently introduced. It differs from the usual instrument in its rim construction which has built-in chambers and two sets of sound openings that amplify the tones. In addition to these is a damper arrangement whereby the player can cause the sound to pass through the openings in it and those in the rim, thereby obtaining increased volume, or can restrict it to but one set of openings. This results in a rich tone of different quality, and an intermediate effect may be produced by using the damper.



Novel Two-Tone Banjo Which Utilizes Two Sets of Sound Chambers, Either Singly or Together

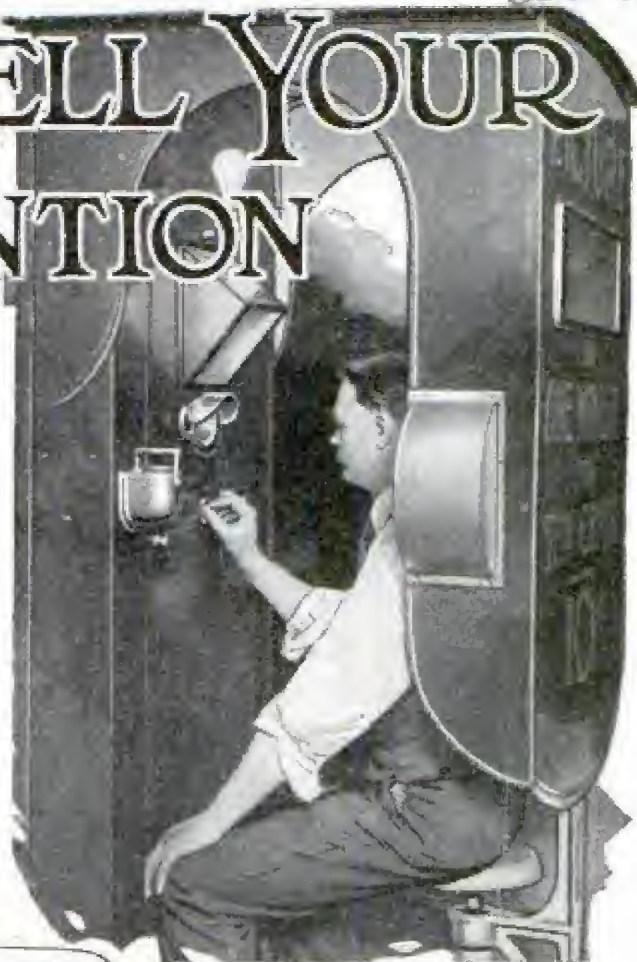
William L. Lange

Emb. George H. Holden, Highgate, N.Y. 1927

Central Terminal, New York

2301 Mr. W. A. ...
1922 Florida Ave, Kenmore,
Ohio

How to SELL YOUR INVENTION



HAVE you a patent lying around the house, earning nothing because you could never find a market in which to sell it, or financial backing to put it to use?

Several hundred thousand Americans are in that position, judging from estimates that fully ninety per cent of all patents issued never return a dollar to the fathers of the ideas.

The creator of any new idea (provided it isn't a perpetual-motion machine or hasn't been previously conceived in somewhat similar form by someone else) can get a patent on it at comparatively small cost.

But getting the patent is the least part



Frederick W. Loehr, Oldest Telephone Craftsman, Who Has Seen the Instrument Grow from Bell's Crude Model, Which He Holds beside the Latest Style; Above, a New Automatic Photo Machine

of the problem. Making it pay is the real task. The question of how to sell an invention really goes back to the old one of what to invent. The product must be, first of all, one for which there will be a demand, in other words one which serves some practical purpose. Secondly, it must be one which can be manufactured, advertised and sold at a price which is not out of proportion to the benefits the user would derive from it.

As an example of what that means, an inventor who has a long list of successful patents to his credit, turned out, as one of his early efforts, a water-motor reel for winding up the hose after the lawn is sprinkled. He went to a manufacturer, who promptly pointed out that, while the motor would eliminate the labor of reeling the hose by hand, the cost of the outfit would be more than any-

one would care to pay for the slight benefit he received.

As a general thing it has been stated that a simple and inexpensive invention with a widespread field will return greater profits than a complicated and highly expensive machine. Can openers—a need in every kitchen—have returned far greater profits than Zeppelin airships. A complicated machine, to earn large profits, must serve a wide field and be a real labor saver. The reaper, binder and threshing machines are good examples.

Given a good idea, the problem of selling it can be tackled after or before patenting, just as desired. Many embryo inventors have an idea that a villain lurks around every corner waiting to steal their ideas. After an inventor has obtained a few patents and discovered how hard it is to practically give them away, his ideas about patent thieves are considerably changed.

Some people have the erroneous idea that letters patent from the government constitutes an exclusive franchise to manufacture the product described for a certain number of years and is a guarantee against infringement. In reality a patent is nothing but a written record that on such and such a date the inventor actually possessed such an idea. It is up to him or his assigns to protect themselves against infringement, for the patent is only useful

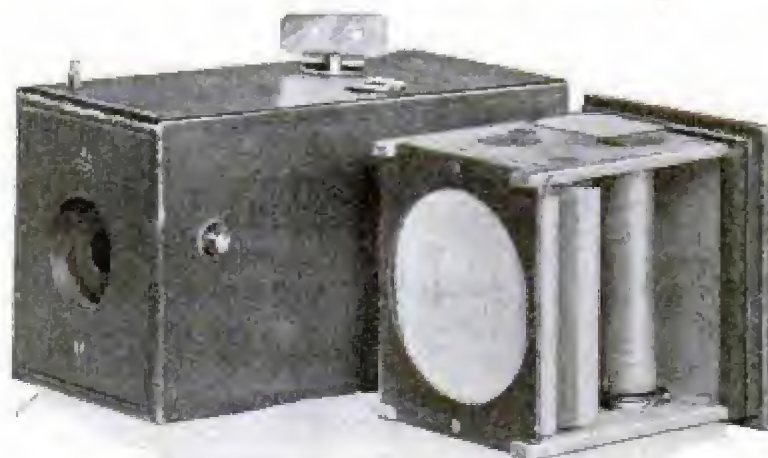
in some cases, and the date established by taking the papers to the post office and having them stamped with the official government date stamp. Once witnessed and stamped, the inventor's idea is safely protected for two years, even though someone later has the same idea and actually patents it, for the patent proceedings can be contested, if a prior date can be shown.

After the drawings and description are patented or witnessed, comes the real task of finding either a buyer or financial backer. Suppose the invention is an automobile accessory. Where would you try to market it?

As a general thing, the most likely field would be among existing auto accessory manufacturers who did not have a device for a similar purpose already represented in their lines. The reasons are obvious. Such a manufacturer probably has factory equipment suited for the making of the new product, and is perhaps not engaged to maximum capacity in the making of his existing line. He knows the automotive trade and knows whether the new idea would serve a useful purpose and be a good seller. He already has existing jobber and retailer contacts, and his sales and advertising forces are ready to handle an additional line. His manufacturing, sales, advertising and distribution expenses, therefore, would be a fraction of what they would be if a new company was formed to manufacture the one new device. And, likewise, he has the existing good will of his company behind him, whereas a new company would have to build up its own place in the trade.

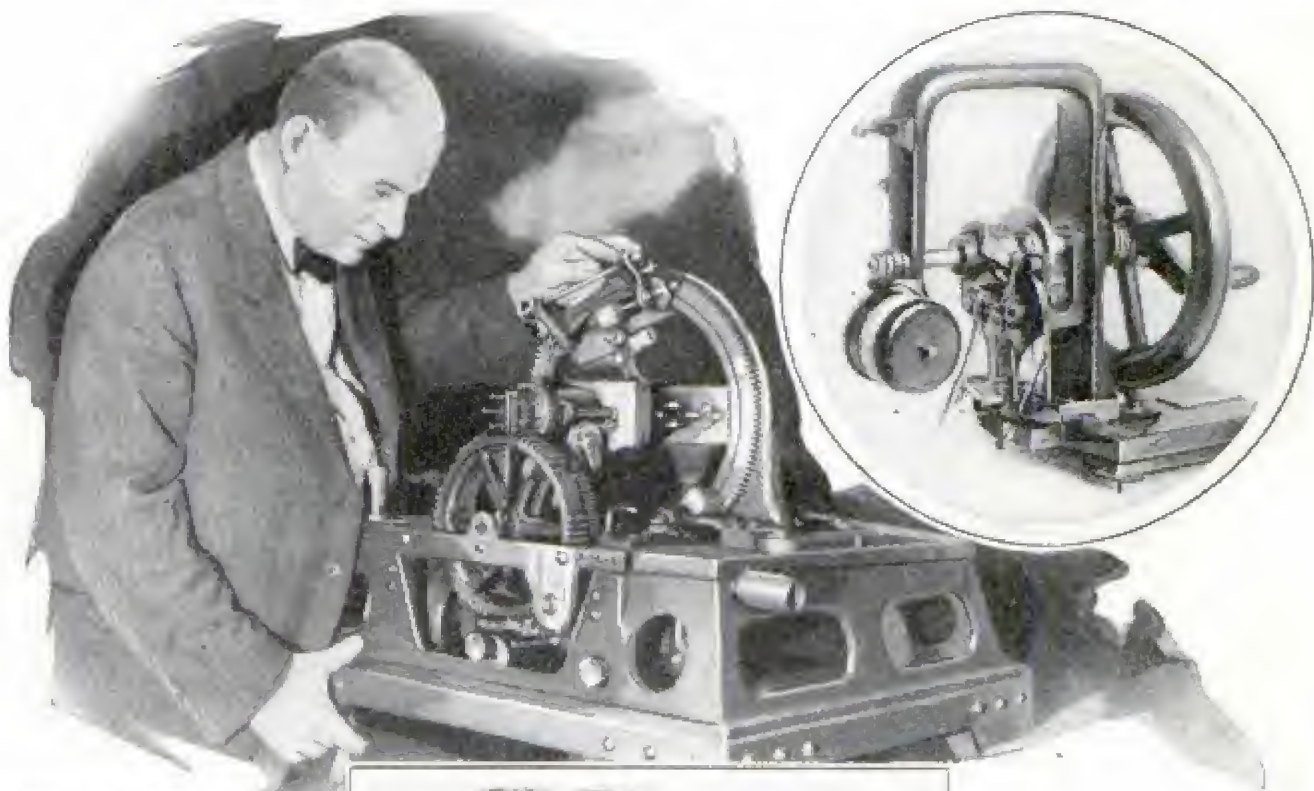
If no company already in the field can be persuaded to handle the invention, then, perhaps, a company in some allied trade, or one with plant equipment for the manufacturing problem, can be interested. If not, the inventor's next step may be the formation of a new company.

The best field for that is in your own home town, among friends, neighbors and others who know you. Usually the inventor puts in his patent, plus, perhaps, a small amount of capital, and the other incorporators put up proportionately larger



The First Kodak Roll Holder, Invented in 1888, Has Been One of the Biggest Money Makers in History

in that it establishes the priority of his idea. Many inventors establish the same fact by showing their drawings to two friends, having both witness them before a notary, who signs and seals each sheet to attest the date. Even the notary has been elim-



John R. Gammeter, Who Has Devoted Years to Inventing New Machines for the Rubber Industry; at Right Is the First Selden Automobile, Which Started the Famous Selden Patent Litigation; Insert, Howe's Original Sewing Machine



is why the sales problem really goes back to the question of what to invent.

A patent for a chicken roost with a disinfecting feature, after lying idle in its owner's hands for four years, was recently put to use. The owner, liv-

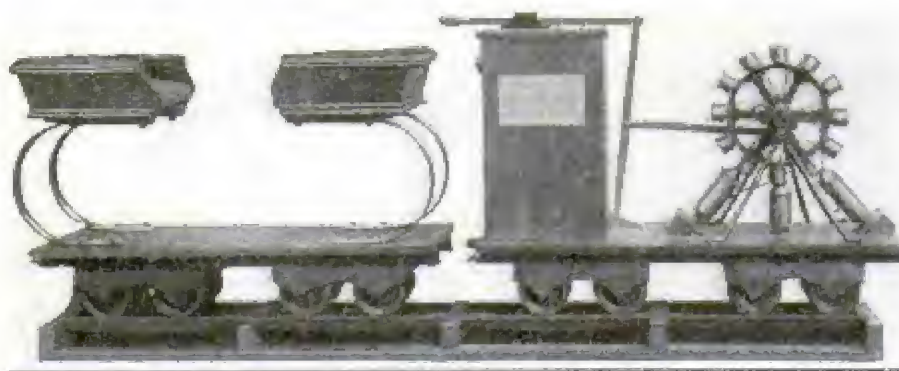
shares. If \$50,000 of paid-up capital is planned, the patent, for example, might be valued at \$5,000, and the inventor assigned a corresponding share in the company.

The inventor doesn't always stay in the company when a new one is organized to manufacture his invention. Sometimes he prefers to sell the patent outright. One experienced inventor says it is easier to sell a half interest in a patent and then give the buyer the other half, than it would be to sell the whole thing. Buyers who would hesitate to assume the full responsibility, he claims, can be persuaded to take a half, and pay as much as they might be asked for the whole, merely because they feel the owner of the other half is going to share the responsibility of establishing a market for the invention.

The man who has a device which will serve a real need, and that can be made and sold at a price within keeping with the service it is to perform, sooner or later is going to find a market for his idea, which

ing in Nebraska, had obtained his papers, and then couldn't find a market. A friend of his met an Iowa manufacturer of chicken brooders who casually expressed a desire for such a device to add to his line. The friend introduced the two, and a satisfactory sales agreement was reached. The patent probably will never earn any vast fortune for either inventor or manufacturer, but as a side line, easily marketed with existing factory, sales, advertising and jobber forces, it will earn a certain and fairly steady income.

Recently the inventor of an automatic quarter-in-the-slot camera was reported to have sold his rights to a group of New York capitalists for \$1,000,000. His device was quite complicated, but the field for it was so great that it could earn money on even that large investment. If it was never used for anything but to make the small photographs for chauffeurs' licenses,



From This Crude Model of the Farmer Electric Motor and Car, the Entire Electric Railway Business Has Grown in One Lifetime

passports and similar documents, it probably would earn a fortune.

For contrast, consider the bomb-dropping devices used on war planes, several types of which have been patented. All are fairly simple and not particularly expensive to make, but the inventors will never earn any great fortunes for the simple reason that so few people need bomb-dropping machinery.

The often-stated axiom that the simple and inexpensive invention will pay better than the complicated is only partly true. The real test is the number of people who are potential customers.

The revolving cups by which the weather bureau measures the wind velocity is about as simple an invention as one could want, but after all of the possible customers have been supplied, the inventor probably had no great return on his idea. An automobile, on the other hand, is a fairly complicated and highly expensive device, but there are 20,000,000 or so in use and more being made and sold every day.

On the other hand, fortunes have been spent in developing mechanical vote-recording machines, but if every voting district in the country had one, the number probably wouldn't equal one year's output of one auto factory. Compared with that, the hookless fastener is so cheap and simple that it can be placed on billions of articles of various kinds.

Usually the inventors that are the most successful are the ones who stick to their own field. A street-car motorman inventing improvements on street-car mechanisms is apt to succeed, for he knows his subject, but if he turned to household utensils or astronomical instruments, he stands a good chance of being a failure. Inventing things in the other fellow's field, how-

ever, has intrigued countless thousands, for the foreign pastures, for some reason, always look the greenest. The inventor who strays outside his own field is likely either to turn out an impractical device, or reinvent some old idea. Thousands and thousands of inventors every year, after months or years of hard work, are

turned down by the patent office because somebody else had the same idea, maybe years ago. One inventor, for example, spent two years laboring to produce a variable eccentric for a machine he was working on, and then learned, after he succeeded, that exactly the same idea had been patented forty years earlier.

If he had had any previous experience, he would have known that a few cents would purchase from the patent office descriptions of patented devices for that purpose, and among them he would have found the very one he wanted. For \$10 a patent attorney will search the records and tell you about everything that has been invented in any given field.

The bugaboo of patent thieves is so great in some inventors' minds that occasionally men are found who do not want even to tell their patent attorney what they want to invent—despite the fact that the lawyer must have drawings and a description prepared before he can file them.

For those who are afraid to confide even in their lawyer, the signed and witnessed drawings and descriptions present the obvious solution. The inventor is then allowed two years' grace to perfect the idea before he need submit his application for the patent papers.

Professional inventors keep notebooks and sign and date each day's notes and sketches, and, if the idea appears particularly important, even have the date and signature witnessed and sealed.

2663

STUMPS REMOVED WITH ACID

Removing stumps with acid instead of blowing them out with dynamite is the method used successfully in Germany. A hole is bored in the wood, equal parts of

no other data

nitric and sulphuric acid poured in and, in a few weeks, even the hardest wood is said to be so affected by the action of the liquids that it can be crumbled with a pick. Besides being easier, the process is less dangerous.

SHIP BASIN FOR OIL TANKERS HAS FIREPROOF DOOR

On an island built of sand, dredged up from the harbor bottom, the port of Havre, where American troops landed during the war, has built the most modern fuel-oil depot in the world. It is unique in many ways, but particularly because the basin in which the oil tankers unload their cargoes from overseas has been fitted with a fireproof door which closes the entrance gap so that, should a carelessly dropped spark set fire to oil floating on the water, the flames cannot spread to the rest of the harbor. The oil depot is operated under a private company, with a sixty-year concession from the government. The 250 acres of land provide room for thirty-three tanks with a capacity of 786,000 barrels of oil, a pump house with pipe lines to all the tanks, a boiler house, electric generating station, chemical laboratory, workshop, a filling station for barreling oil for shipment inland, and shortly a refinery is to be added. The ship basin is big enough to handle the largest tankers afloat at any stage of the tide.



Oil Base at Havre; a Fireproof Door Closes the Entrance to the Ship Basin



Lawnmower with Interchangeable Blades, Based on the Safety-Razor Principle

CHANGEABLE BLADES ON MOWER SIMPLIFY TRIMMING LAWN

Marking a radical departure from the ordinary types, a lawn mower now on the market has interchangeable blades which may be discarded and replaced almost as easily as those of a safety razor. There are thirty-six on the twelve-inch model cutter, each being a small square of stamped steel. They are fastened in six rows, extending around the revolving unit and present a solid cutting surface. Contact is made against a spring bar close to the ground, and it is said to be impossible to destroy the alinement of the blades by catching a stone or stick. The entire cylinder or separate blades may be changed, and by reversing the knives, double service is gained. A close-cut, even trim is obtained with the mower, according to reports.

More than 1,200,000 farms in the United States are now equipped with radio sets.

Commerce Reports 5/23/27



How the Building Was Quickly Dried for Early Occupancy; the Hot-Air Pipes and Pumps Installed and Operating

PUMP HOT AIR IN NEW BUILDING FOR QUICK DRYING

To make new buildings suited for occupancy within a few days after completion, German engineers are using a system of compressors to force hot air into the interiors. Delivery pipes are rigged to supply all floors, the apparatus being constructed so that it can readily be taken down or set up and hauled from job to job. The plan is said to be especially useful for concrete houses which can be made ready for rental in two to four days by the treatment.

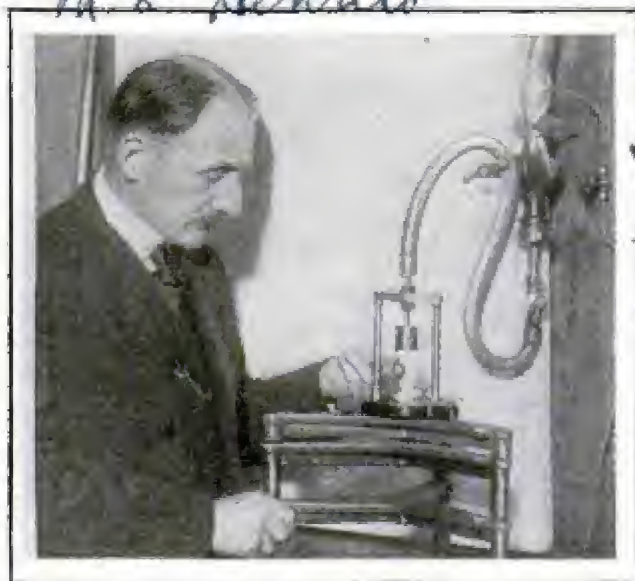
X-RAYS IN CRIME DETECTION AID IDENTIFICATION

That X-rays may be used like fingerprints to establish identity, is suggested following their successful employment in a case involving a murder victim who had left considerable property. The man had attempted to enter Tibet and had dropped out of sight purposely, shortly before his venture, so that his plans might not be frustrated by his government which forbade entrance into that country. Seventeen days later, the bodies of two white

men, disfigured beyond ready identification, were found seventy miles from the camp where the man had made preparations for his journey. One of them bore a scar such as had been on the victim's head. His physicians, by means of X-ray photographs, taken at the time of the treatment and later, established the identity of the victim beyond all question. This is said to be the first case on record in which the rays were so employed.

FASTEST TOP IN WORLD IS SPUN WITH AIR

Spinning tops for science is one of the interesting activities of a French investigator who has been studying rotary effects. His tops are quite different from the ordinary toy variety, being accurately constructed rotor units of brass alloy, propelled by compressed air. His fastest one has made 11,000 revolutions a second, by measurement, and its actual speed is believed to be considerably greater, but instruments of sufficient delicacy were not available to check it. The operating principle is unique. The unit is so adjusted and the air so applied that the top literally floats in air as it spins. As yet, little practical use has been made of such speed, although a purpose was found for one of the tops at 75,000 revolutions per minute.



One of the Record-Breaking Tops, and Compressed-Air Apparatus in Which It Is Spun

Science News Letter

Laboratory art and

OLD PRISONS SERVE AS SCHOOLS IN PORTO RICO



Where Prisons Serve as Schools; Views of Old Spanish Fortresses at San Juan, Porto Rico

Prison cells in old Spanish fortresses have been converted into schoolrooms as the latest step in Americanization processes carried on by the United States army in Porto Rico. American officers are learning to speak Spanish, and Porto

Ricans, who are also enrolled in the 65th infantry regiment stationed at San Juan, are learning English, and many of the classes are conducted behind barred windows and heavily grated doors, installed some 400 years ago. The schools are maintained in El Morro and San Cristobal fortresses. Writing of the transformation that has been made in some of the rooms of the former, Lieut. C. R. Smith, editor of the regimental paper, says: "Doors of heavy steel bars still swing to and fro at

the entrances. Sunshine entering the windows still etches perpendicular parallel lines on the walls. Iron hooks still remain here and there in the masonry to recall the hammocks that had swung therefrom for the repose of all-night lodgers.

And well-worn stone floors remain to bring a mind's picture of former restlessness by day. However, modern school desks, blackboards and chalk dust give a real school atmosphere and, when the machines of the typewriting class click, the teacher must feel as well satisfied with things in his cell room as does any old maid hearing the teakettle singing."

☛The cost of a radio program may reach from \$5,000 to \$7,000 an hour.



Section of a Vast Harbor-Development Model, with Buildings, Ships, Automobiles and People All Reproduced to Scale; Commercial-Model Making Has Become an Important Industry

Modeling Whole Towns in Miniature

Demand for Toy-Size Reproductions of Cities, Harbors and Plants Creates New Industry for Experts in Scale-Model Making

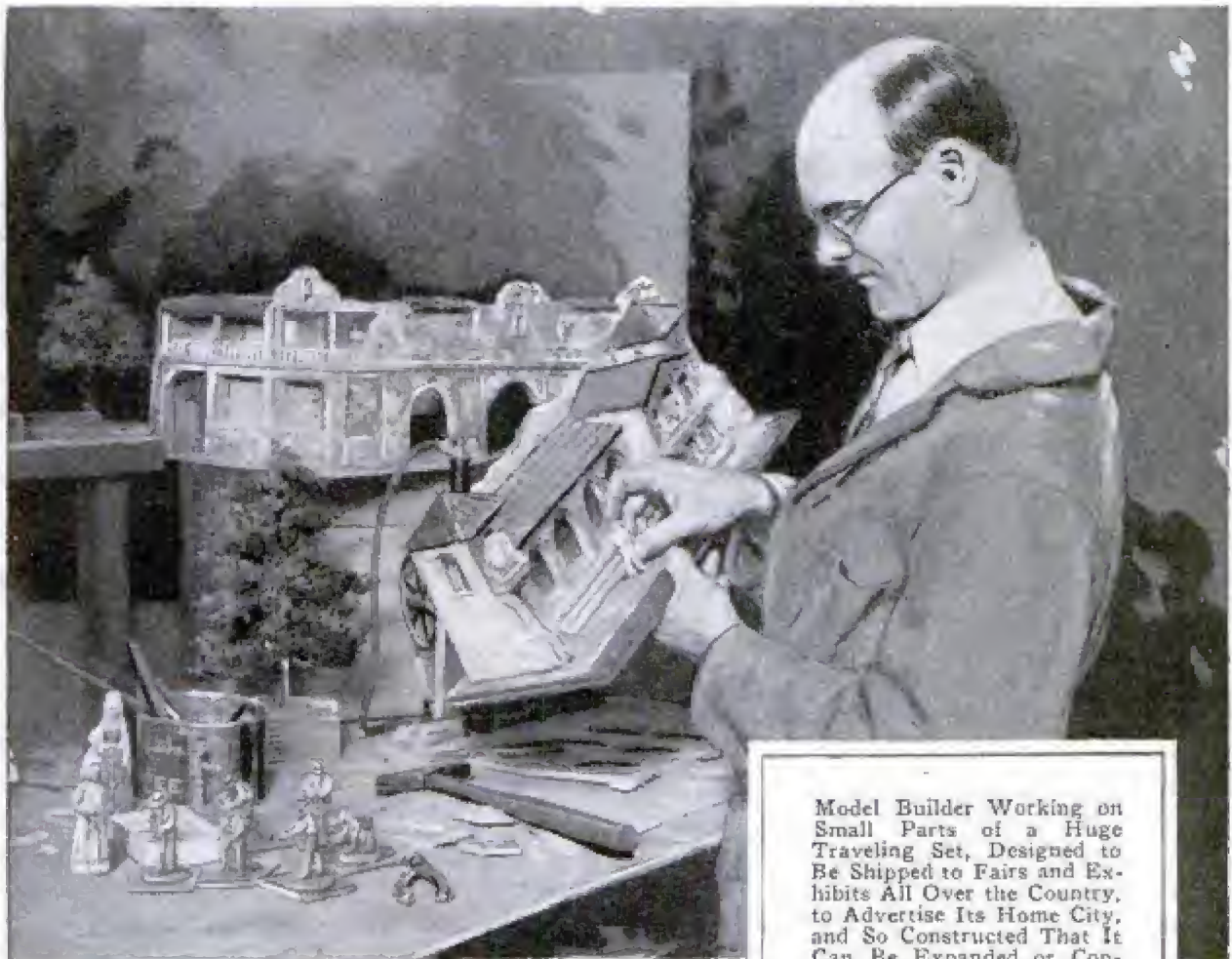
IN sixteen years of building miniature models for industrial exhibits, William Fowler, of Los Angeles, has developed his creations to a point approaching perfection. His sets include complete steel plants, potteries, oil, mining, fishing and textile industries, motion-picture studios and all classes of California farm enterprises. Every item, however inconsequential, is worked out in the minutest detail—even to the eyes of fish a quarter of an inch long. Some of his sets have been built on as fine a scale as one-twenty-second of an inch to the foot.

Now under construction is a vast harbor set, thirty feet in length, in which vessels only three-fourths of an inch long will move about on real water. This set will be an exact replica of the Los Angeles harbor district, and to make it accurate, photos were first taken from an airplane of the area to be duplicated. These photos were then thrown upon a large sheet of

drawing paper with a stereopticon lantern, and the outlines of waterways, docks, buildings, railroads, etc., were traced. Upon these tracings the set is being built.

An odd assortment of commodities contributes to the making of the details of other sets. For instance, flower seeds were used for the bodies of the tiny fish in the fishing set; short sections of macaroni were painted to represent the drain tile in the potteries set; scrap iron in the steel mills consisted of slugs, gear wheels and springs from discarded clocks; tile roofs were made from the corrugated pasteboard used around Mazda bulbs in stock; trees and foliage from kelp, steel wool, sponges, certain mosses and ferns imported from Germany, and the cabbages in a truck garden were made from rosebuds, such as milliners use, and tinted green.

Practically every part of the work is done by hand, except that dies are used for the structural brick and tile and some



Model Builder Working on Small Parts of a Huge Traveling Set, Designed to Be Shipped to Fairs and Exhibits All Over the Country, to Advertise Its Home City, and So Constructed That It Can Be Expanded or Contracted to Fit Any Size of Exhibit Booth; Below Are William Fowler, at the Left, and Two of His Assistants, Working on an Oil-Well Model, Being Reproduced from the Enlarged Picture in the Background



of the architectural decorative effects. The human and animal figures are molded in wax, using a flexible glue mold for such pieces as have undercut parts which could not be drawn from a rigid mold. Shelves are filled with tiny men, women and children in all sorts of postures, waiting to be painted to match the set to which they are called. Cattle and other live stock assume the most lifelike postures and are a startling contrast to some of the cruder type of sets where dolls and toy animals used to take the place of the figures. Some of the chickens in the farm sets are no bigger than the "BB" shot used in an air rifle.

The buildings generally are made of compoboard or heavy cardboard, and in the industrial buildings a covering of corded cloth is applied and treated with aluminum paint. This, with a brown stain here and there to simulate rust, gives them exactly the appearance of corrugated iron.

The trees and foliage are works of art. The larger specimens, such as a sturdy pine tree, are built up branch by branch with evergreen foliage. A fruit tree in bloom is achieved by dipping the branches in glue and then blowing tiny shreds of

pink tissue paper upon them. The effect is true to life even at a short distance. Steel wool, tinted green, does very well for the smaller shrubs, and certain ferns and agar-agar are used for the leaves of small trees.

The building of the sets is pretty much an industry in itself, for several are on the road at one time, with special cars and special crews to take charge of their erection and dismantling during exhibits and fairs. In this way there is a minimum of wear and tear. The construction shop has such a variety of equipment and stock of papier-mache horses, statues, mechanical effects, etc., that it has the appearance of a theatrical-property storeroom. Most of this material is salvaged from year to year and used again in another form.

Mr. Fowler adopted model making more as a pastime than a profession sixteen years ago, after he had been temporarily blinded in a steel plant in the east. His slow recovery forced him to take up creating such things as he could to amuse himself while lying in bed, and the accompanying illustrations show to what a high plane he has developed his art.



Part of a Background of Harbors of the World, to Be Used behind a Miniature Traveling Model of the Los Angeles Harbor When It Is Exhibited in Other Cities

Highfield View
Capital View Road
Charterfield Eng.
and Mr. Phillips Thomas

2377

**NATIVES OF CONGO
USE FISH GLUE FOR
WATERPROOFING**

Natives of the Congo region in Africa waterproof their clothing, as well as their canoes, with a preparation made from fish scales. To facilitate the task of removing the scales, the fish are laid out in the hot sun for an hour or so and then scraped; whitebait, bleak, dace and roach being the species commonly used. The scales are mixed with twigs of various native plants and boiled for several hours, until a thick fish glue is obtained. The glue, when thinned by heat, can be applied to cloth or to the canoes and, after thoroughly drying, forms a waterproof coating that compares with the best products of modern chemistry and besides is considerably cheaper.



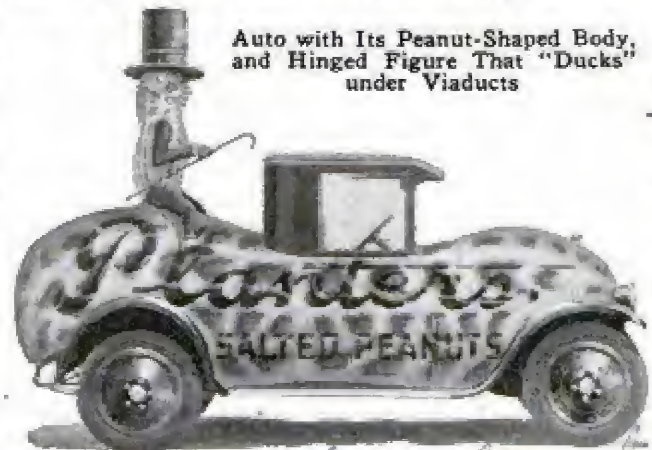
Dr. Harvey C. Rentschler Explaining His Radio Furnace to S. P. Grace, President of the New York Electrical Society

**POWER TRANSMISSION BY RADIO
DEMONSTRATED IN TESTS**

Electric lamps held in the air, glowed brightly although not connected to wires, during interesting tests in transmitting power by radio, recently. In a "radio furnace," chemical reactions were initiated by wireless waves. A disk of metallic tungsten, among the most infusible of all metals, was heated white-hot on exposure to the rays. In the opinion of many investigators, developments in power transmission by radio promise practical service for the future.

**PEANUT-SHAPED AUTO BODY
ADVERTISES PRODUCT**

To make an automobile body look like a peanut for advertising purposes, craftsmen of an Indianapolis company had to solve several perplexing problems. One involved the indentations on the "shell." As they were nearly all of different size, all had to be done by hand, and special shading applied with peanut-colored paint to bring out the depth of the grooves and markings. Each spot was heat-treated and hand-drawn. To insure proper ventilation for the radiator, an opening was cut in the front of the steel body and a heavy wire screen welded on. A dummy figure on top of the body was fashioned from sheet steel and hinged so that it could be folded back when needed in passing under viaducts.



Auto with Its Peanut-Shaped Body, and Hinged Figure That "Ducks" under Viaducts

**RECORD NON-STOP TRAIN RUNS
OVER TWO HUNDRED MILES**

What is said to be the longest non-stop run in regular railroad service has been inaugurated on an English line from London to Carnforth. The distance is 236 miles, the only delay being to add an extra engine for the pull over a steep grade. One of the purposes of the new train is to afford better connections to Ireland.

Lancashire
Watm. St. Pancras route

The Muespang & Co. Body Corp.
Indianapolis

2370



Making Use of Waste Space; Upper Part of Door Converted into Photographer's Showcase

DOOR IS MADE INTO SHOWCASE TO INCREASE PHOTO SALES

By converting a near-by door into a shallow showcase, a Cincinnati photographer increased his exhibit space and obtained a special booth for the display of various kinds of cards. The glass pane in the upper part of the door served as a

window and the rest of the case was easily built. Besides promoting the sale of cards, the plan attracted more patrons for the picture studio.

SOLDIERS FORM LIVING SIGNS TO GUIDE AIRPLANES

Two squads of soldiers are lying prone, the underside of their haversack flaps, painted white and orange, exposed. From an altitude of 4,000 feet or more, an observer looks down from his airplane, reads the code revealed by the little color spots and notes the exact location of the groups and possibly the rest of the infantry position. This interesting maneuver is a development of modern warfare, necessitated by the increasing use of the airplane in scout and defense work. At Fort Benning, Ga., experiments have been made recently, using parts of the doughboys' equipment to give the signals. The meat cans were found effective in attracting attention because of their glitter, but not reliable in relaying messages. Strips of cloth fitted to the inside of the meat-can pouch flap, underneath the haversack flap, the gas-mask satchel, and helmets having a shutter containing three triangular slots and rotated to expose the polished surface of the crown alternately, were tried with varying degrees of success.



Forming a Signal for the Airman above Them; How Soldiers and Their Accouterments Are Utilized to Communicate with Men in Airplanes, a Development of Modern Warfare

1st Infantry, 2nd Sam Houston Texas.

Paul Miller

HORSE RACE TIMED
BY SHADOW

Accurate timing of horse and other races with an ordinary stop watch is difficult under most conditions and to simplify this task, a South African inventor has introduced a simple apparatus which utilizes the light-sensitive properties of selenium. Essential parts of the mechanism are a clock, a lamp and a receiver. The clock is started automatically with the beginning of the race and ticks off the seconds and quarter seconds electrically. A beam of light shines across the track into a receiving instrument so connected to the clock that when an object cuts off the illumination, the resulting shadow affects the selenium element in the receiver, with the result that the clock is instantly stopped. Thus the winner's shadow registers the exact time of the race. In case there is more than one lap to the run, the clock can be operated so that it will not stop until the end of the race.

TWO-PART SAFE-DEPOSIT KEY
GIVES EXTRA PROTECTION

It is sometimes necessary, in matters of trust or corporation management, to place securities under the joint control of two persons. A divided key, designed especially for safe-deposit boxes, solves the problem in a case of this kind. Each person is given half of the key and they both must go to the box together or one must give his half to the other, for both parts are required to open the lock. The parts fit together easily, as shown.



Watering the Terrace Garden Is a Simple Process and the Vegetables Are Easily Tended, Sometimes without Having to Stoop

VEGETABLES GROWN IN TIERS
TO SAVE SPACE

Quantities of vegetables can be produced on relatively small space by planting them in a rack, as illustrated in the accompanying photograph. Abundant soil is provided in the center and the plants are protected from severe rains and too much sunshine. Strawberries, carrots, onions, spinach and radishes were successfully grown in this compact garden, and the system simplifies the work of tending the plantings considerably.

CRAB TRAVELS THIRTY MILES

About a year ago, a crab caught near Lynnhaven Inlet on Chesapeake bay, was tagged with a Lincoln penny and released. Just recently, it was found by fishermen in the York river and identified by the man who had tagged it. The crab had traveled approximately thirty miles.

Chas. H. Withers
6133
Chicago
The Mosler Co.

By J. J. Frazzelle
Bristol Va.



A Rug That Tells Ancient Legend of a Lost Prince; Oriental Masterpiece Counting 600 Knots to the Square Inch

WEAVING RUG OF "LOST PRINCE" TAKES FIFTY YEARS

One of the finest examples of oriental rug-making is seen in the rug of the "Lost Prince," so called because the figures represent an old eastern legend of that name. There are but six of these in the world. One, now in the possession of a Chicago firm, counts 600 knots to the square inch and took over fifty years to complete. Few of the finest examples of Persian rugs have over 300 knots in that surface space. The designs and figures are worked in soft coloring and with the most minute attention to detail.

UNSEEN LIFE WITHIN THE SOIL PLAYS BIG PART IN WORLD

Under our feet is a whole swarming world of life, unseen and unknown to almost everyone, but having an important effect on the world of larger plants and

animals. It is the realm of the soil bacteria, fungi and other low forms of life. Certain kinds capture the carbon dioxide from the air, build it into their bodies, and when they die, release their organic substances as humus for the enrichment of the soil. Others utilize nitrogen from the air and it is eventually turned by the higher plants into meat-making materials. One of the greatest services of the bacteria lies in breaking down dead plant and animal bodies, returning them to the dust whence they came. Were it not for these lowly creatures, the earth's surface would soon be littered with carcasses, and the material basis of life locked up beyond recovery. The process is not a simple one and requires more than one class of bacteria, one group of "wreckers" carrying the

work as far as its nature permits and another taking it up until another stage has been reached. By this tearing-down process, the creatures make it possible for themselves and other organisms to find homes.

RUBBER BALL ON FISH HOOKS PROTECTS FROM WEEDS



For surface or deep-water fishing, a three-hook tackle unit has a red and white rubber-ball lure that is said to protect the hooks from weeds. It is simple to use, having no wires to bend and nothing to get out of

order, and is said to be effective for bass, pike and muskies.

Progressive Tool & Mfg. Co.

Continued by Sir John Russell directed by...
 1276
 \$1.60 retail sale
 wholesale \$1.00-1.50 doz

SPOTLIGHTS IN RADIO STUDIOS TO AID PERFORMERS

Acting on the psychological principle that many persons do their best work when in an environment that harmonizes with their moods or temperament, officials of a radio-broadcasting company have planned special studios for different performers before the microphones. For instance, the operatic and theatrical stars will stand in the glare of a spotlight while they do their bit for their invisible audience, and the rest of the room will be arranged to give the effect of an actual auditorium filled with listeners. Columns like those of the old Roman forum are the chief features of another studio in which prominent men are expected to feel more at ease while broadcasting; another is designed to stimulate minds to which the mystic carries great appeal. This has the appearance of a Gothic church interior with alternate dark and light sections suggesting arches and aisles and the pattern of a church window thrown on the floor in light. Comic artists will perform in a gay studio fitted in the fashion of Louis XIV, and jazz bands and singers will be made to feel at home in a studio where futuristic designs are predominant.

TRACTOR FOR LIGHT FARM JOBS REDUCES WORK AND COST

Intended especially for cultivating corn planting, mowing and other farm tasks usually done by horses, a lightweight tractor now on the market can be easily hitched to various implements and is said to be as simple to operate as an automobile. It develops speeds from one and one-half to six miles an hour, provides more than twenty-two horsepower and is designed to supplement the bigger tractor in such a way that complete motorization of the farm can be accomplished with moderate expense.



For the Tasks Too Light for the Usual Tractor, This Handy Unit Does Faster Work Than with Horses

Some of the Furniture Pieces and, at the Right, How the Block Looks When Assembled

FURNITURE SET AND PUZZLE CUT FROM SINGLE BLOCK

Ten pieces of toy furniture have been cut from a single block of wood and are so arranged that fitting them together or taking them apart constitutes an entertaining although not difficult puzzle. The pieces are so shaped that they may be used to imitate furnishings of a school, house or lodge room.

FIREPROOF LIQUID FOR FABRICS ALSO PROTECTS WOOD

Textiles, woodwork and other materials are said to be thoroughly protected against fire by treating them with a special liquid now on the market. It is colorless, odorless and transparent, while harmless even to delicate fabrics, the manufacturers claim. A fireproof disinfectant is also available.



1304 Los Angeles, Calif.
Axelrod Specialty Co.
1508 Reid St.
Los Angeles, Calif.

Marvin Parich Mfg. Co. Inc.
539 E. Dearborn, Chicago

not yet ready for Continental Motor Co.



What the Amsterdam Policeman Is Wearing for Night Functions; the Coat Is Easily Seen by Motorists

LUMINOUS COAT SAVES POLICE FROM TRAFFIC ACCIDENTS

Traffic policemen in Amsterdam wear long coats that reflect light from near-by sources at night, so that motorists and pedestrians may see them more clearly and the officers' signals be more easily interpreted. Barred sleeves also aid in directing traffic.

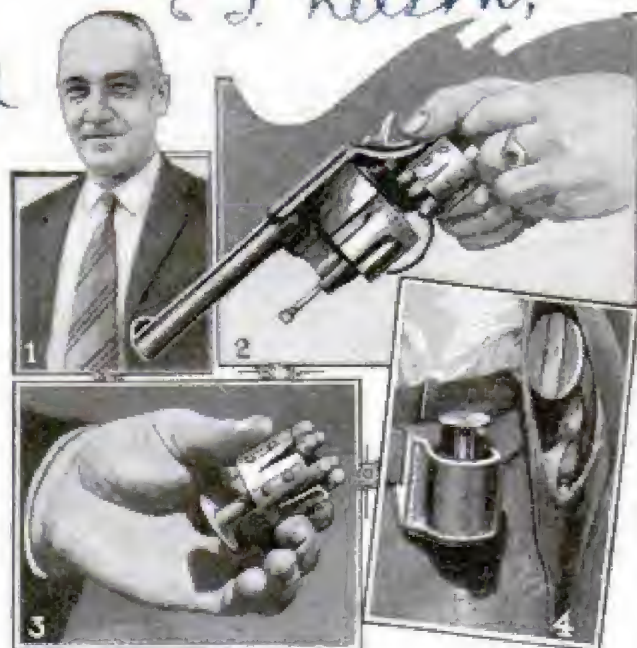
KEY TO LANGUAGE OF MOSES FOUND ON MT. SINAI?

Fragments of the mysterious Sinai inscriptions which may throw additional light on Moses and Biblical history, have been found in Arabia by Prof. Kirsopp Lake, head of the Harvard-Michigan expedition to Mt. Sinai. Some of the inscriptions were discovered more than twenty years ago, on the mountain where Moses received the tablets of the law, according to the Bible account, but complete trans-

lation of them has not been made, partly due to their odd characters, which are allied both to the Egyptian hieroglyphics and the Semitic alphabet, but are not identical with either. According to one translation, Moses himself was the author of the writings which describe his position as superintendent of the mine workers of Sinai and give thanks to the Egyptian queen, for having rescued him as a child from the Nile. One scholar estimates that the inscriptions date back to some time between 2000 and 1200 B. C., when copper and turquoises were mined near Sinai.

RAPID RELOADER FOR REVOLVER 2646 AIDS POLICE WORK

Refilling a "six-shooter" can be done in three seconds or less with a loading unit invented by a Kansas City detective. It consists of a nickelplated holder containing six springs, shaped to hold one cartridge each. At the end is a plunger, which, when pressed, causes the springs to push the six bullets into the cylinders of the revolver. In a demonstration, a policeman reloaded his weapon in two seconds with this device. It was inspired by the detective's experience during the World war, when he realized that lives sometimes



Inventor E. L. Nelson and Three Views of the Revolver Loader; Inserting It, Detached, and How It Is Worn

were lost because of the delay involved in loading revolvers by the ordinary hand methods.

Chicago Evening Post 5/27/29

Holland

E. L. Nelson



Wilson Popenoe Bringing in a Load Avocado Budwood, One of the Many Fruits Which He Introduced into America; the Government Searches the World for New and Profitable Crops

Searching the World for New Foods

Plant Explorers Go to Ends of the Earth in Hunt for Delicacies for Our Tables and Gardens

By UTHAI VINCENT WILCOX

*Jakoma Park
Washington, D.C.*

"A SLICED ilama and cream, waiter."
"Sorry, sir, but we are all out of ilamas."

"How about a marang, then?"

"It is out of season for marangs."

Or, if this restaurant of the future is out of mangosteens, it is possible that the patron can get Zarda melons, carabaos, paradisiaca plantains, itzamas, or a dozen other fruits now unknown on the breakfast tables of the United States.

The particular ones mentioned above have been introduced by the department of agriculture, and experiments are under way to determine just what regions of the nation are best adapted for their growth, and just how American people will receive them. They came from the out-of-the-way places of the earth, mostly tropical.

The search that sends plant explorers

into remote regions of Europe, Asia, Africa or South America, is not for undiscovered lands or fabled riches, like the explorers of old, but frequently their efforts are rewarded far in excess of the hardy sailor men who years ago brought home their ingots of gold. There is a touch of romance in the work that turns a few handfuls of seeds, a dozen or so of cuttings from plants heretofore uncultivated in the United States, into a great contribution to the country's wealth.

There is the case of durum wheat, used extensively for macaroni making. It was brought to the United States for cultivation in the northern states, where the climate is cold and unfavorable for a wheat which matures earlier than that species. Today this crop has a value far in excess of \$50,000,000.



Nearly 50,000 separate introductions have been made by the plant explorers and many of these are a most important part of our agriculture. Durum wheat is not the only notable example of plant immigrants that have since become thoroughly naturalized. There are a number of regions in the United States that owe their prosperity, and in some cases the very existence of their agriculture, to one of these plants brought in or sent in by a government plant explorer from some distant corner of the world. This is true of the date trees of California and Arizona; the feterita, Kafir and Sudan grass fields of the west; the dasheen patches of the south; the Panariti currant vineyards of California, and the rice fields of Texas and California.

It might seem that the reservoir of the world's flora would soon be drained of all possibilities and that a few years would tell us the limitations nature has set for our enjoyment of flowers, fruits and seeds. But explorers are still busily searching in distant places, and the lists of their findings show that we are nowhere near the end of the possibilities of the plant world.

One of the hardest tasks that the food-plant explorer has to meet is the gathering of accurate information from ignorant natives. Dr. Wilson Popenoe, who found the avocado, or alligator pear, in Guatemala, was warned again and again not to pick the fruit except when the moon was full. To do otherwise was dangerous, the natives claimed. Besides, they were certain that the avocado would be unfit to eat.

Dr. Popenoe went through India, Arabia, where he spent a year, and also northern Africa. He has spent six months in Brazil and a year and a half in Guatemala, a year in Mexico and six months in the West Indies. His work was concerned largely, in his later travels, with the avocado, giving attention also to the Andes berry and giant blackberry of Colombia. While he never was attacked by wild beasts, he was five times jailed during his travels. He was accused of being a German spy, a

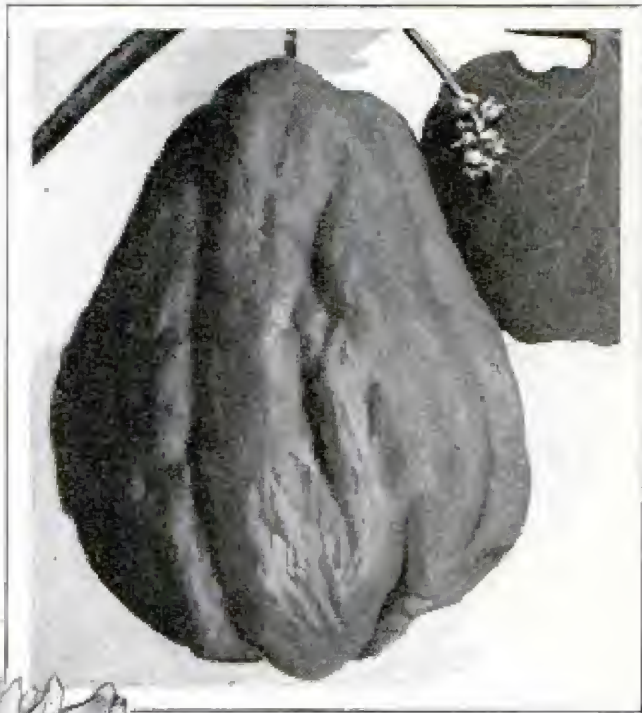
thief, suspected of inciting rebellion, and held for a short while over a difficulty about a hotel bill. Frank Meyer,



Head of Sorghum Cane, Some Chinese Cabbage Grown Outside Washington, and a Fruiting Branch of the Chaulmoogra Tree

another plant explorer, was time and again robbed and molested by robber bands in the eastern countries through which he passed. He finally lost his life by drowning in a river in China which he was attempting to cross. Another, J. F. Rock, recently spent much time in out-of-the-way places of Tibet. While there he had a nearly deadly encounter with a man-eating tiger.

Dr. David Fairchild says that those who live in the north may wonder at the seeming preference for plants of the hot countries, but he explains that the plants which grow in the colder regions are those which have slowly crept out of the tropics, adapting themselves to the changes. Furthermore, there are ten times as many undiscovered plants remaining in the tropics today as are to be found in the colder regions of the globe.



The inventories containing the descriptions and some of the history of these strange exotic plants read like a romance in serial form. One paragraph may take you to Mexico where some inquiring traveler has discovered a plant, related

to one of our common weeds, whose seeds once filled the granaries of the Aztecs. The scene shifts to Africa, the source of a number of crops now important to American agriculture, or to China, a veritable wonder garden of fruits and nuts, vegetables and flowers. Then there are the queer plants of New Zealand or Australia which may have possibilities as a provider of wood, food, shade, or beauty to our future generations.

The explorers have found a blight-resistant pear that grows in China which may save our future orchards of this fruit from a devastating disease. Some of these may be used as stocks on which to graft more luscious varieties. From the same country have come chestnuts, the yang-tao, a fruit said to "combine the flavors of the gooseberry, strawberry, pineapple, guava and rhubarb," and the jujube, an odd fruit now being grown in California.

The great variety of plants found by



Close-Up of the Chayote. Top: an Artichoke. Center, and a Farm Hand Picking Chayotes at the Plant-Introduction Garden



Persimmon Tree Which Produces a Non-Astringent Fruit, and Some of Its Product

these scouts for the tables of America seems almost endless. There is the neem tree from India with wood like mahogany, fruit that yields a medicinal oil, and sap that may be made into a cooling drink; the giant lilies from the Himalayas; the mitsuba, a common vegetable from Japan that resembles some of our native plants found growing all the way from Nova Scotia to Texas; high-yielding wheats from England and Australia; from Colombia a night-blooming cereus with blood-red flowers like saucers; the New Zealand corkwood tree with wood half the weight of cork; from Yucatan a dooryard tree whose leaves provide delicious greens; a wild rice from west Africa that may be used for marsh pasture; a citrus fruit from India with a concentrated peach flavor; Australian elephant grass which yields thirty tons of hay to the acre, and from the same continent an edible canna, a single plant of which, in Florida, has produced eighty pounds of tubers.

Most interesting of the introductions from nearer home is the "haauhtli" of Mexico, resembling pigweed. It was culti-

vated by the Aztecs before Columbus discovered America. The Spaniards made a flour of the grain which they used in making cakes. The plant is being given close study as it may be most valuable for growth in regions that are too dry to grow corn. Other plants from our neighbors include a large number from Guatemala and other countries of Central America—chayotes, the inga, a tropical walnut, a hitherto neglected tropical fruit called the coyo, a grape and a brilliant flower suggestive of the poinsettia.

"The many generations that will



inherit the hills and valleys and prairies we now call ours may complain that we have wasted some of their rightful inheritance, but we may feel sure that they will bless us for making it possible for them to enjoy in increasing measure the fruits of all the earth," said Dr. Fairchild in commenting on the work of his food explorers and scouts. "Because of the efforts of these men, they will have in their gardens, fields, forests and dooryards hundreds and even thousands of plants that were unknown here when the Indian girdled trees to provide a sunny spot for his corn patch."

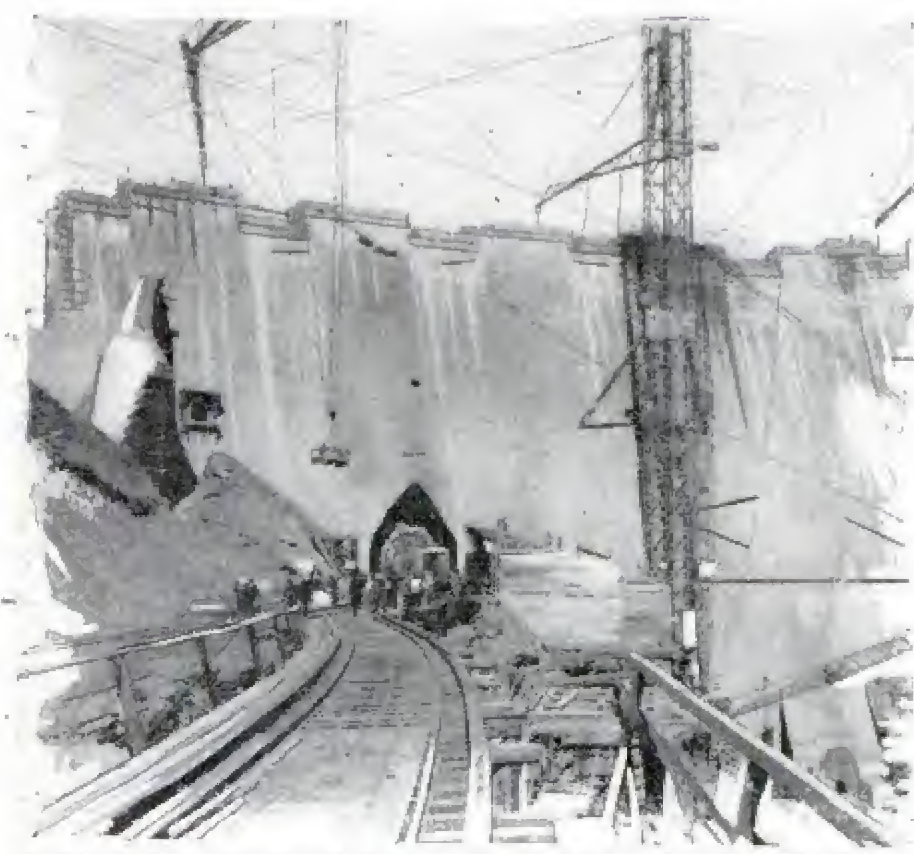
¶The Popular Mechanics Bureau of Information offers its free service to all readers of this magazine. Names and addresses of manufacturers and dealers in articles described, and any other details will be promptly furnished by the Bureau.

WATCH RUNS FOR THREE YEARS AND NEEDS NO WINDING *2765*

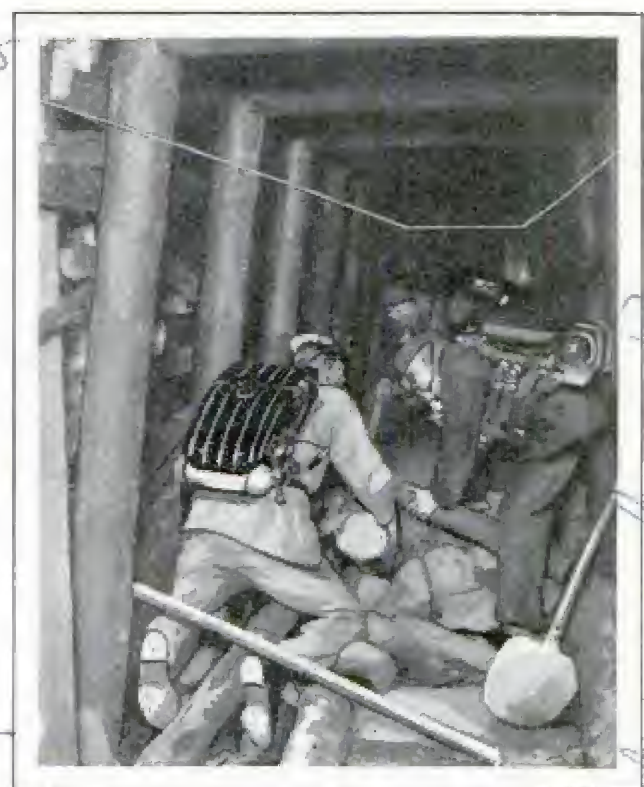
Movements of the wearer's wrist are sufficient to keep a watch, introduced by an English craftsman, running satisfactorily without winding. As the arm and hand are moved, a small weight or balance inside the watch is swung, keeping the spring coiled. Before introducing his invention to the public, the watchmaker is said to have worn one of the pieces for three years, during which it kept accurate time without winding. *2480*

DAM BUILT AROUND RAILROAD WITHOUT STOPPING TRAFFIC

So that railway operations could be carried on without interruption, the Exchequer dam on the Merced river in California was literally built around the tracks of the road, which followed the river canyon. When the dam was done and a new course had been constructed for the railway line, the tunnel hole through the barrier was plugged with concrete. Another feature of the task was the use of a steel tower, 475 feet high, for distributing the concrete. The completed dam is 330 feet high and has a top length of 955 feet.



Exchequer Dam near Completion, Showing the Tunnel through Which Trains Were Run Until New Line Was Finished; Hole Was Then Stopped Up



Demonstrating the Use of the Contact Cable in a Mine Shaft; an Alarm Is Sent Simply by Pinching the Wire

CONTACT CABLE GIVES ALARM AT PINCH OF FINGER

Inclosed in a flexible tube, conductive wires have been devised by a Hungarian engineer so that pinching of the outside of the "jacket" causes a contact and the sounding of an alarm. The cables are especially suited for use in mines, in homes and offices as burglar signals, in police and hospital quarters for communication, and in connection with machinery for cutting out the current. Installed under a carpet, for instance, an alarm would be sounded simply by stepping upon the tube. The covering protects the wires against moisture and eliminates the danger of fire. In a test, as many as 63,000 contacts were made at one point, without damaging the wires. As a fire alarm, the cable has proved efficient since the two wires are fused at a high temperature.

*Telephonwerke & Kabelindustrie
A. G., Berlin, Germany.
Dr. Hungarian engineer. G. Nagy.*



Ironing Pad Exposed; It Gives an Effective Surface to the Board and Will Not Burn

IRONING PAD THAT WON'T BURN MAKES WORK EASIER

To give a springy surface to the ironing board, a soft hair pad that is guaranteed not to burn has been introduced. It is said not to curl or wrinkle, lies flat and is designed to fit all popular-sized boards, being fifty-four inches long. It is reversible and stoutly edged.

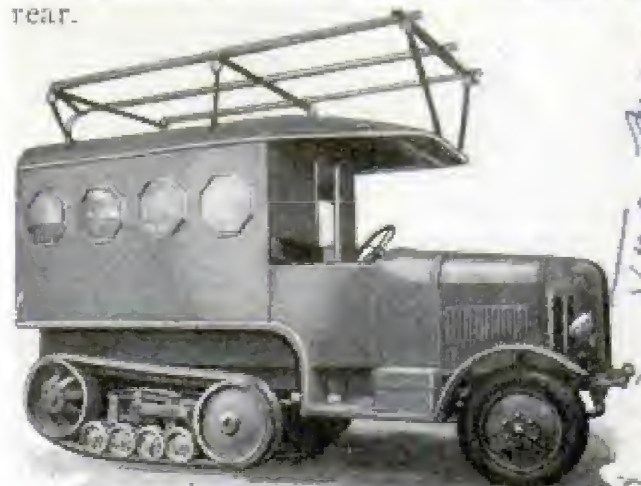
SPECIAL NURSE CARES FOR FISH ON RAILROAD JOURNEY

Successful shipment of sixty-five live fish, three king crabs and one lobster from New York to San Francisco was accomplished recently, marking what experts declare is a record for a long-distance journey without a special fish car. The specimens, including a number of salt-water fish, were carried in tanks and were constantly cared for by a trained aquarium keeper. Out of the total number starting the trip, all but nine arrived at the end of the 3,169-mile ride in good condition. A special water filter was employed, oxygen was supplied to the tanks in carefully regulated quantities, and a temperature of seventy-two degrees was maintained until warm territory was reached. Water in the

cans had to be filtered from five to seven times a day, each filtering requiring two hours and thirty-five minutes, including the time consumed in washing the filter. On long train journeys, fish are subject to car sickness; coal dust and dirt accumulating on the water are not good for them; on sharp curves, they are likely to be dashed out of the buckets, and the changing temperature of a baggage car is harmful. Before the successful journey, an attempt was made to send live specimens to New York from the Steinhart aquarium in San Francisco, but only one, a leopard shark, lived to reach the city and it gasped out its last as the train was pulling into the terminal. A singing fish lasted but eight hours.

RADIO ON DESERT AUTO AIDS EXPLORING PARTY

Remote parts of the Sahara desert are being explored by automobile, and one of the latest units in this work is a special car equipped with radio receiving and sending apparatus for both long and short-wave service. An advantage of the latter installation is that messages can be easily received while the car is running, less power is required in sending and adequate antennae are provided in three insulated metal bars on the car's roof. When the auto is stopped, a mast and wire are unwound from a drum and rigged for reception from all stations. The generating equipment for operating the radio is also used for providing electric lights when camping. Like other types of autos designed especially for travel across the sands, this one has an endless tread at the rear.



Desert Auto Equipped with Radio Outfit; Both Long and Short-Wave Apparatus Were Carried

Société Anonyme
André Citroën 14 3.

180 N. Wacker Drive,
Chicago

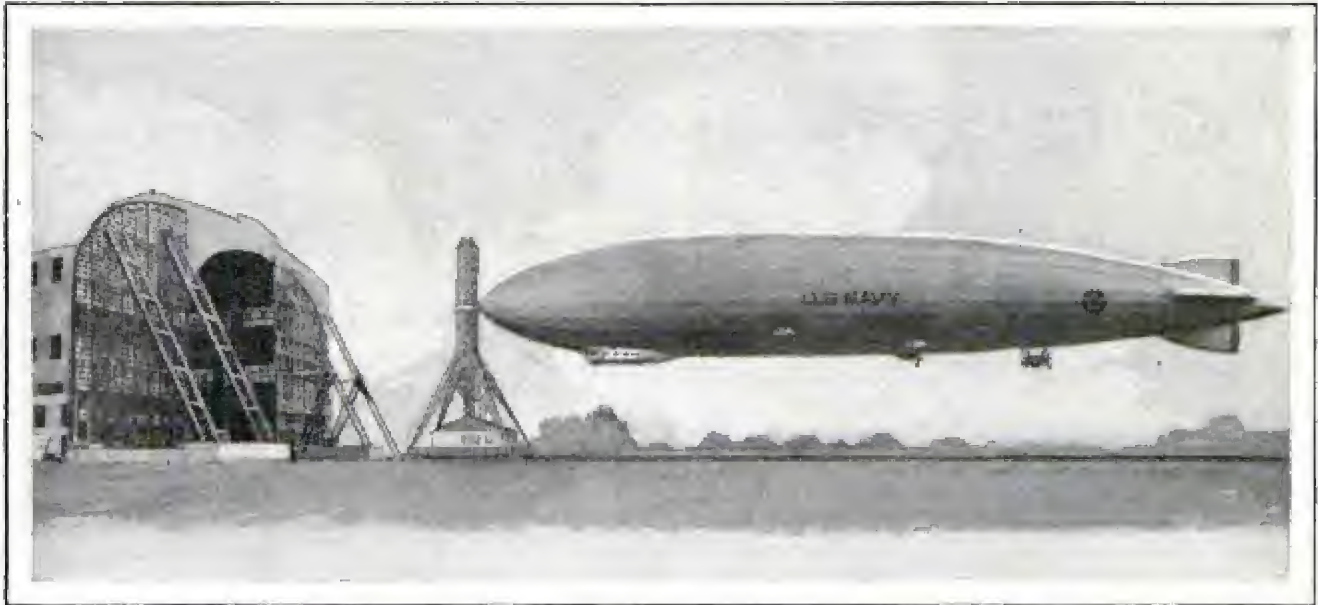
Robert J. Langer, San Francisco
Steinhart Aquarium

Paris, France

MOORING MAST ON RAILS DOES WORK OF FIVE HUNDRED MEN

To simplify the task of running dirigibles in or out of a hangar, a locomotive

and insulin has been too costly to allow wide use. In the belief that nature has secreted a substance which may be as effective in the treatment of the disease, the tests on holly are being conducted,



Illustrating How the Motor Mooring Mast Would Appear While Pulling the "Los Angeles" into Its Hangar at Lakehurst; It Has Its Own Motor and Runs on Track

mooring mast has been designed. It operates on a wide track, carries its own machinery and has a passenger elevator inside and mooring ring elevator on the outside, the ship being attached to this ring with a ball-bearing socket. In case an adverse wind blows, the tail of the dirigible can be hauled around with tractors. Sometimes as many as 500 men are required to place a large ship, such as the "Los Angeles," in its hangar. It is said that only a few men would be needed with the motor mooring mast and there would be less danger of damaging the dirigible.

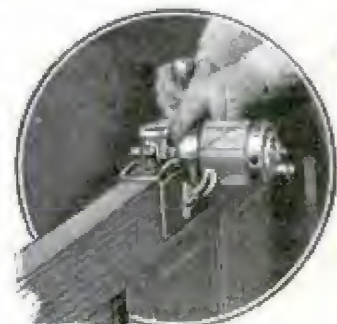
MEDICINE FOUND IN BLUEBERRY RELIEVES DIABETES

Discovery of a substance in the blueberry, which is said to be a valuable aid in the treatment of diabetes, has encouraged the department of agriculture to investigate holly leaves as a possible source of a like material. Dr. Frederick M. Allen, of Morristown, N. J., who found the blueberry element, employed it on some fifty diabetic patients with relatively satisfactory results. Its effects are said to be somewhat the same as those of insulin, but it has the advantage of being applicable as a hypodermic injection or through the mouth,

and experiments will be made with other plants. George F. Mitchell, of the bureau of chemistry, who has manufactured tea from holly, is co-operating with a medical-research company in the investigation. The chief function of insulin and the blueberry substance in treating diabetes lies in lowering the sugar content of the patient's blood.

HAND PLANE DRIVEN BY MOTOR SPEEDS CARPENTERS' WORK

Designed especially for smoothing the edges of doors and similar surfaces, a motor-driven hand plane now on the market is capable of fine adjustments, works rapidly and operates on either direct or alternating current. An apron at the side holds it for planing at right angles or angles of lesser degree. Boards as much as four inches wide can be planed by smoothing first from one side and then from the other. On door edges, the side guide insures accurate planing.



R. L. Carter Co.

*Dept. of Agriculture
Washington
2476
Chicago '642
W. W. Washington Dist.*



Handle of Cane Pulled Back to Expose the Gun; Weapon Is Quickly Made Ready for Firing

GUN HIDDEN IN CANE HANDLE TO FIGHT BANDITS

To discourage the Paris apaches in attacks on citizens, a French inventor has introduced a combination gun and cane. By pulling the handle out a few inches, the weapon is made ready for inserting the shell, and the trigger is released by twisting a ring on the cane. Aside from its weight, it can scarcely be told from an ordinary walking stick when the firing mechanism is concealed.

ACID GAS FOR LUNG TROUBLES HELPS CURE COLDS

Mild cases of tuberculosis, hay fever and colds are reported to have been benefited by exposing the patients to fumes from a special acid preparation developed in Germany. The substance is merely placed in an evaporating dish at the side of the sufferer, who inhales the helpful vapors with each breath. The discovery was the result of an odd happening in a factory. Workmen in a certain department, where the acid was used, noticed an exceptional feeling of well-being and employees in other sections made it a habit to eat their lunches in these rooms. Further investigation showed that workers near the acid had remarkably sound respiratory organs and were free from grip and colds even

during epidemics. Experiments were then made with animals. Guinea pigs, exposed to the acidified air, were not made sick when inoculated with tuberculosis bacilli, although others, not placed in contact with the vapors, died shortly after being subjected to the germs. The acid appeared to slightly irritate and then harden the bronchial tubes and the lung passages. The tests were repeated with human beings, over a period of several years. It was found that vapors from the acid, distributed in living and sleeping rooms, protected the inmates from respiratory infections and facilitated recovery.

LAWN SHEARS GUARD KNUCKLES AND REDUCE STRAIN

For trimming the grass close to sidewalks, and for similar tasks, a pair of shears now on the market differs from others in that it enables the user to employ the natural gripping movement of the entire hand, an up-and-down toggle action being applied to the blades. The grips are designed to fit the natural lines of the hands and are so arranged that the knuckles do not come in close contact with the ground.



Shears in Use and Close View, Showing Arrangement of the Handle

The Alliance Toy & Specialty Co., Chicago

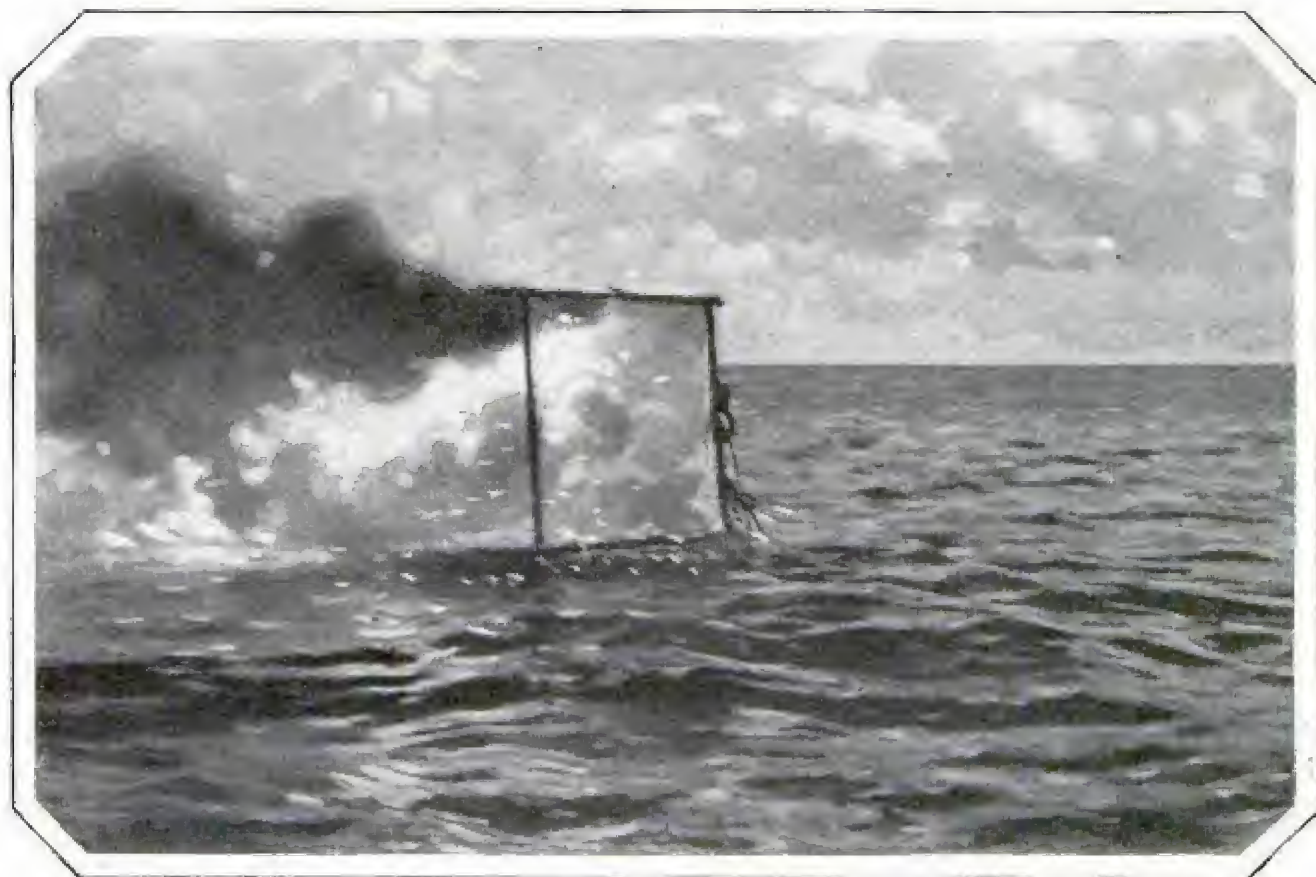
Distributor: Kapf Acid Agency, 172 W. Washington St., Chicago
 and at this address 6/1/22
 Dr. W. von Kapf

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Retail - \$2.00 each
 Wholesale - \$1.20 per dozen
 \$12.00 per dozen



Exploding a Pound of Flashlight Powder in a Single Charge, to Assist the Sunlight in the Taking of Color Photographs of Fish on the Coral Bottom of the Gulf of Mexico

Color Photos Reveal Submarine Wonders

How Autochromes of the Ocean Bottom Are Obtained
with the Aid of Huge Flashlight Charges

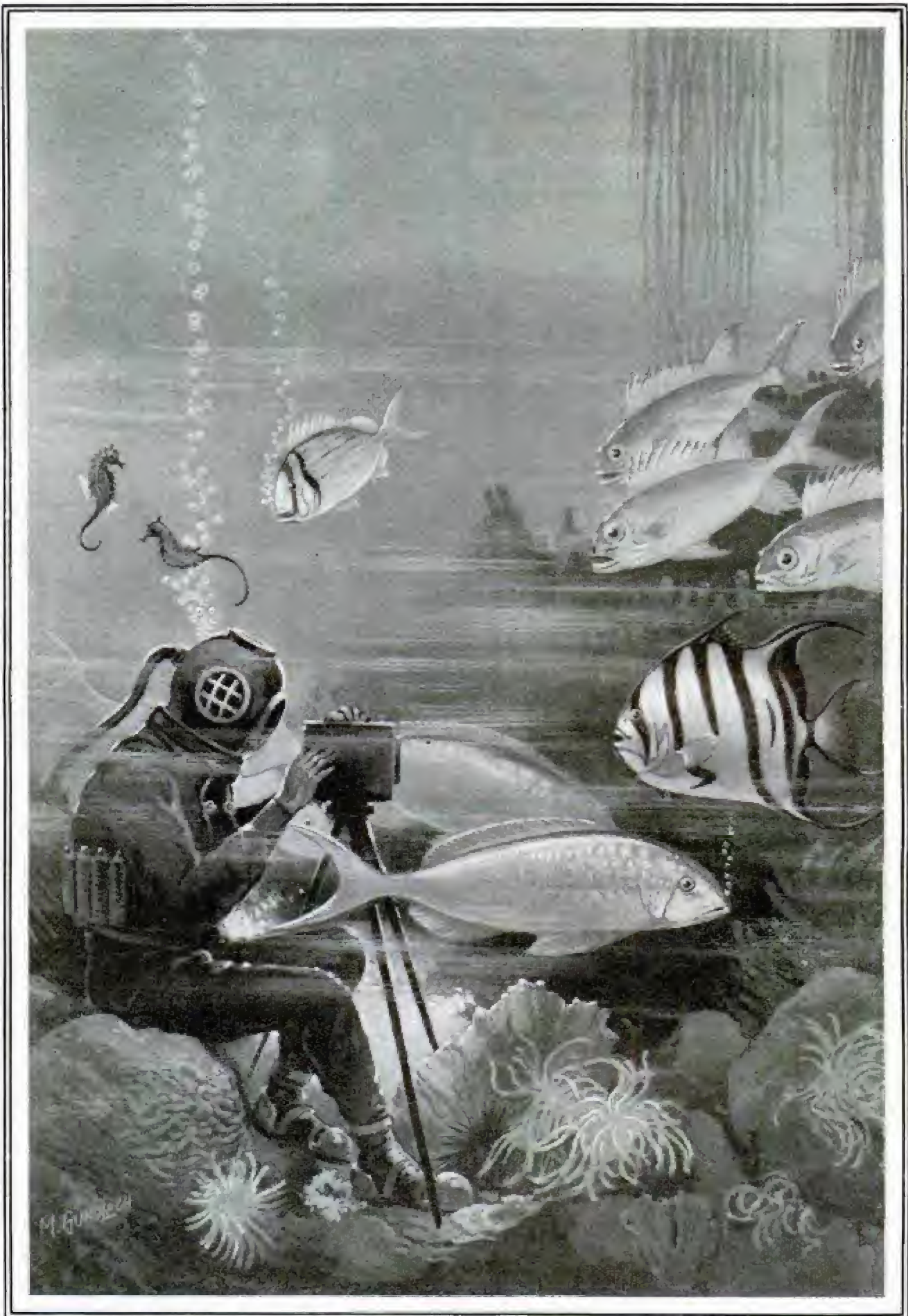
SITTING on the bottom of the sea and popping off a pound of flashlight powder at a time, Dr. W. H. Longley, of Goucher college, and Charles Martin, of the National geographic society, recently obtained successful natural-color photographs of life under the ocean. This interesting camera conquest was made off Dry Tortugas in the Florida Keys and was accomplished only after many months of experimenting and considerable risk. Dr. Longley was seriously burned by a premature explosion of a large flashlight charge.

Their early attempts at color pictures were made with supersensitive plates but even at a depth of only fifteen feet, the natural light was so greatly reduced that satisfactory results could not be obtained. The flash apparatus was therefore arranged and proved so efficient that supersensitive plates were not needed.

The powder was first set off on the dory in which rode the men who worked the air

pumps, but this was not a success, as the flash and the camera shutter could not be accurately synchronized and the strain of waiting for the explosion proved trying to the occupants of the boat. Consequently, a pontoon that could be controlled by the diver was constructed to carry the powder, the dry battery that furnished the spark for firing and a reflector for directing the rays of light downward into the sea over the field of operations. The photographers could wait until the fish were in the best pose before taking the picture. The camera was inclosed in a brass case with a glass window in front of the lens and, with the aid of a mirror set at an acute angle, the operator was able to focus the instrument without bending over, a task that would have been rather difficult in a divers' helmet.

Another scientist who has contributed much to man's knowledge of the under-sea world through his camera is Dr. Paul



The Diver, with His Camera Inclosed in a Watertight Metal Case, Often Sat for Hours Waiting for a Fish to Get in Just the Right Position to Have Its Picture Taken

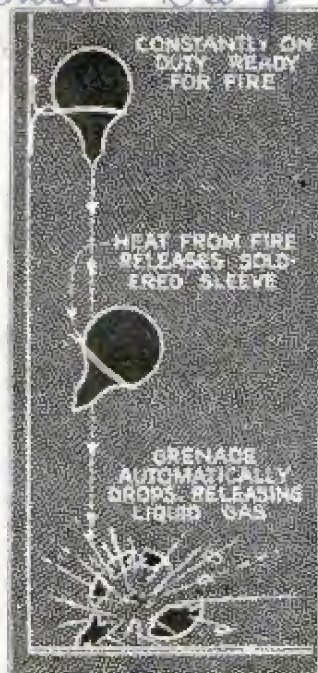
Enterprises 535
445
25th Ave New York

Bartsch of the National museum. He has visited the creatures of several oceans in their natural haunts and describes the realm under the surface as an enchanting one, dimly lighted with a soft silvery "atmosphere," suggesting the effect of sunlight streaming through stained-glass windows upon clouds of incense. The fish do not seem to be annoyed by an intruder when he is actually among them, Dr. Bartsch says.

There are several tricks to submarine photography, he declares, one of them being proper focus of the camera to allow for the distortion caused by the water. For instance, if the object is six feet away, the camera has to be set with a focal length of three feet. An improved instrument has recently been devised for under-water photography. It rests on a tripod, can be tilted, used for panoramic views and is focused as easily as the land instruments. Another trick Dr. Bartsch has found valuable is learning how to guard against the cold. By rubbing his body with olive oil before submerging, he is able to remain in the water for five and one-half hours at a stretch without discomfort.

SILENT FIREMAN KEPT ON WALL SMOTHERS BLAZE WITH GAS

Added protection from fire is afforded by a chemical bomb attached to the wall, which falls automatically and bursts when the temperature rises high enough to melt a soldered sleeve that holds it. The substance released is a smothering gas, said to be sufficient to blanket an average fire under all but the most unusual conditions in a room of 1,500 cubic feet. The liquid does not injure persons or furnishings. The grenade falls when the temperature slightly exceeds the highest summer heat.



Getting a Soda Mixed to Order by Dropping a Coin in the Slot of a New Machine

COIN-IN-SLOT SODA FOUNTAIN INSURES CLEAN DRINK

Soft drinks are now served in a sanitary manner simply by inserting a five-cent piece in a slot and pulling a lever. The dispenser may be used as a single unit or as part of an installation to furnish a variety of flavors. Only a few minutes are needed to replenish the machine. Proper proportions of flavoring sirup and carbonated water are measured and mixed by specially constructed valves. The materials are not touched by hand and each drink is served in a clean cup that never has been used before.

DOGWOOD HAS MANY USES

Flowering dogwood is widely enjoyed because of its beautiful blossoms, yet comparatively few persons realize that the tree has considerable commercial importance. The wood is used for making golf-club heads, shuttles, bobbins, brush backs, small handles and many novelties. For shuttles and shuttle blocks, the dogwood, persimmon and boxwood are the only kinds used and large quantities are exported. Because of the increasing scarcity of dogwood for manufacturing purposes, improved methods of sawing it are being devised, and its conservation is being urged by appealing to native lovers not to break the branches for the flowers.

International Fire

Equipment Corp.

Wm. H. H. & Co., Phila.

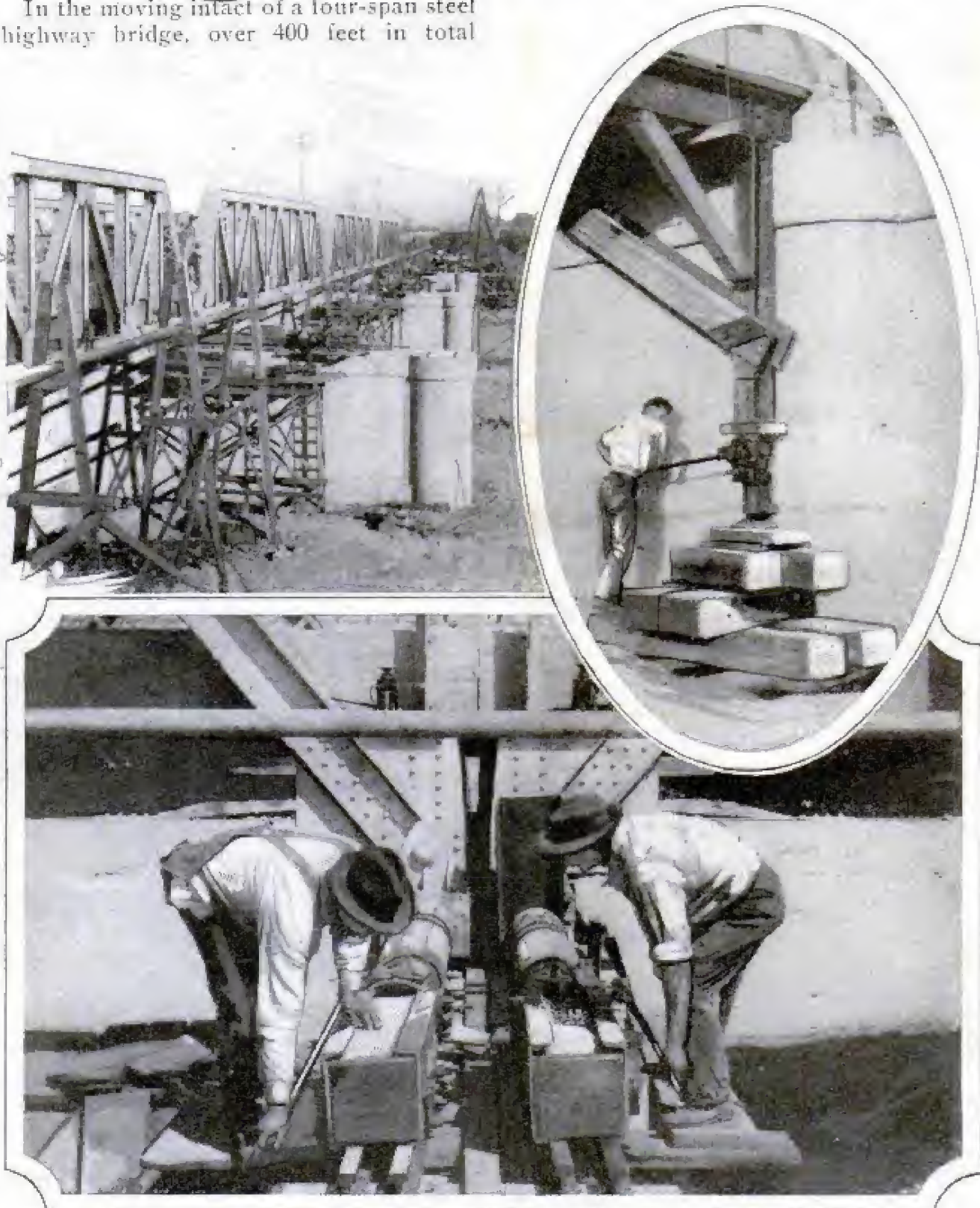
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STEEL BRIDGE IS MOVED WHILE IN CONSTANT USE

In the moving intact of a four-span steel highway bridge, over 400 feet in total

Cmt. Charles Almy, Dyers 412 California Bldg.
Los Angeles, Calif.



When Steel Bridge, Weighing 258 Tons, Was Moved Fifteen Feet upon New Piers without Halting Auto Traffic; View of the New Supports and Raising Legs on Jacks

length, while automobiles, motor trucks and other vehicles constantly passed over it uninterrupted, there has recently been completed, near Los Angeles, Calif., an engineering feat of unusual interest. This bridge spans the Hondo river. From

careful check made upon traffic, before starting work on the undertaking, it was found that approximately 15,000 vehicles crossed the bridge daily, and, since the work required ten days to complete, it is estimated that about 150,000 automobiles,

Ans.

motor trucks, and so forth, passed over it while the moving was in progress. The bridge consists of four steel-truss spans, each 102 feet in length, and carries a twenty-four-foot roadway. The weight of each span, including the roadway, was calculated to be 258 tons, to which was further added, to take care of the traffic, an estimated live load of forty-two tons. Before starting the actual moving, fifteen-foot extensions were built onto each end of the old concrete piers. These extensions, together with the old piers to which they were added, were to give room both for the old bridge, in its new position, and for the new one to parallel it. The trusses were raised on structural-steel lifting legs, to a height of about nine inches, and then two lines of sixty-pound steel rails were run under each end of the spans. These rails were continued out over the pier extensions on the upstream side for the full fifteen feet which the bridge was to be moved.



Fishing for His Dinner in the Cafe Pool; Guests Are Permitted to Catch Their Own Trout from Irrigating Stream

CAFE PATRONS CATCH OWN FISH IN POOL ON GROUNDS

Persons visiting a roadside cafe near Pomona, Calif., may catch the trout for their meal in a brook that runs through the restaurant grounds. While the fish are frying, they may enjoy a walk through the small farm operated in connection with the cafe. Chickens, special game fowl, frogs, squabs, rabbits and other animals are raised to supply food for the patrons. At night, gas jets are lighted over the fish pools so that insects will be attracted and fall into the water where the fish may get them. The stream is also used for irrigating purposes.

POLISH TO MATCH AUTO COLOR PRESERVES PAINT'S SHINE

Preservation of the automobile's "show-room complexion" is sought in a polish that can be had in colors to match those of the car. It follows the principle of face powder and shoe polishes to correspond to the hues of surfaces to which they are to be applied, and is said to be more effective in keeping the original luster of the auto than ordinary polishes.

FOLDING SEAT-FITS IN POCKET FOR CAMPING TRIPS

A chair that can be carried in your pocket has been devised for campers, auto tourists and others. It is a collapsible seat that weighs only two pounds and is but two inches in diameter and ten inches long when folded in its convenient carrying bag. It is strongly constructed, strains are evenly distributed and when set up, it is the height of an ordinary chair. Folding or setting it up takes only a few moments.

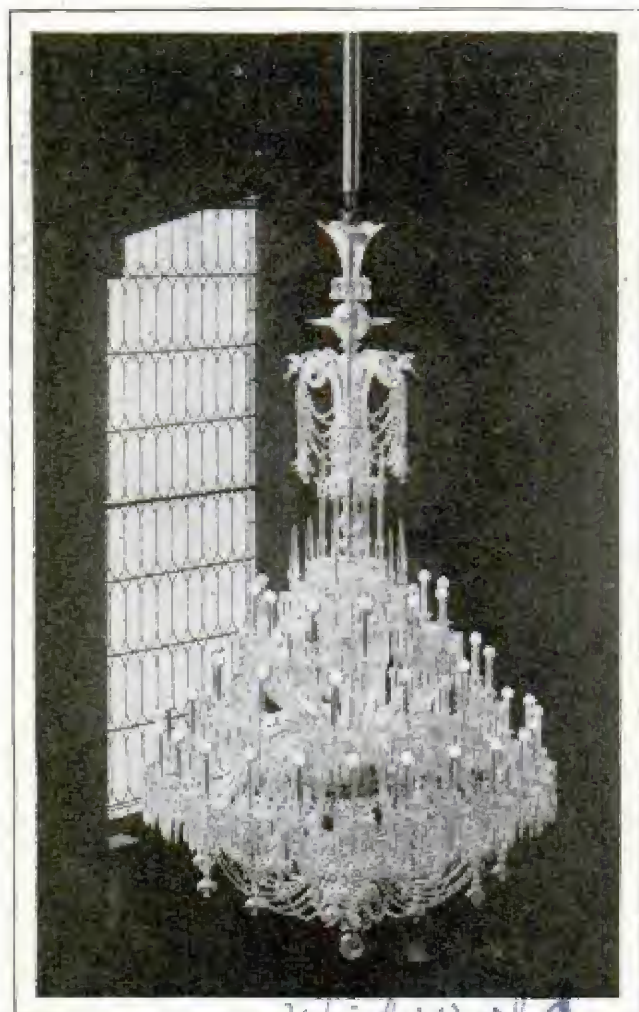


Henry Labass

New York

2617 William St. and J. H. Kenyon
Desplains, Chicago.
220 N. Desplains Pocket Co.
2793 Desplains Pocket Co.

in Chicago



Magnificent Crystal Chandelier Built in Czechoslovakia as a Gift for New York's New Cathedral

TEN-FOOT GLASS CHANDELIER CONTAINS THOUSAND PIECES

One of the finest examples of the glass-makers' art is seen in the ten-foot chandelier presented to the Cathedral of St. John the Divine in New York on behalf of the Czechoslovakian government by Dr. Jaroslav Novak, the consul-general. The assembly contains 1,000 pieces, and forty men worked a year to complete it.

SHIP EIGHTEEN TONS OF FROGS FROM TEN-MILE FARM

More than 36,000 pounds of frogs were caught and sent to Chicago from an Indiana town last season, the "crop" proving a record, partly on account of the long period of wet weather. Lee Myres, the "big frog-leg man" of the district, employed expert frog gatherers who worked a ten-mile area of swamp land. Their pay was based on the pound wholesale rate. In one shipment, a ton of frogs was sent.

Parr, Ind.

LOCOMOTIVE TIRES ARE TRUED WITHOUT REMOVING WHEEL

Keeping the tires of the huge locomotive wheels true is an important task of the mechanical departments of the nation's railroads. This work, which usually takes about six days for each engine when the wheels are removed, can now be done in ten hours on an eight-drivewheel freight locomotive by a method the Pennsylvania railroad has adopted. This is accomplished with the help of a lathe, placed so that it can pull the engine on its transfer table, and a steel cutter set in a block on the brake head. Ten pounds of air pressure placed on the brake causes the cutter to dig in and plane the tire as required. One man can handle the apparatus, controlling the air by means of a cord.

GLOBE MADE WITHOUT PASTE HELPS TEACH GEOGRAPHY

Geography pupils are afforded amusement and helpful instruction in learning to form their own globes from carefully cut-out sections, joined on the equator line, and ready for adjustment to a wire form. No pasting or gluing is necessary as there are holes in the ends of the sections for inserting the support. The globe is four inches in diameter, accurately printed in five colors, and can be assembled or taken apart in a few seconds.

Form-A-Globe

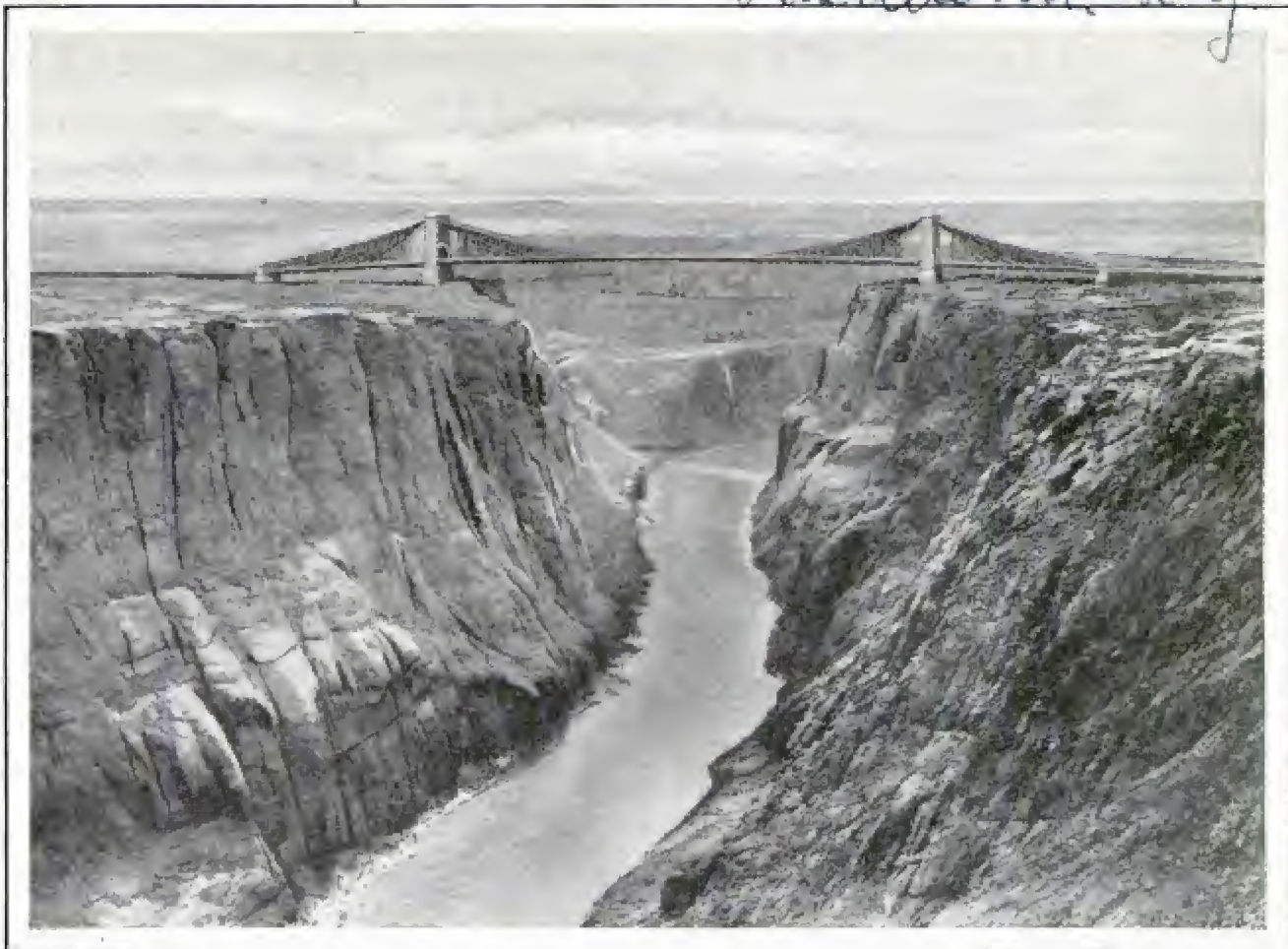


Cut-Out Globe Which Can Be Assembled on a Wire

U. J. Kystrom Co.
224 N. Columbus Ave.

Chicago

Pasadena, Calif.



Northern and Southern Arizona Are to Be United by This Huge Bridge, to Be Flung across the Grand Canyon of the Colorado, Hitherto an Unconquered Barrier across the State

BRIDGE ACROSS GRAND CANYON — TO AID AUTO TRAFFIC

Northern and southern Arizona will be linked more closely together and a new automobile through route will be possible as a result of the bridge soon to be erected over the gorge of the Grand canyon at the mouth of the Paria river, not far from the Utah line. The structure will be one of the highest in the world and will bridge a gap which has remained a dividing barrier since the canyon was discovered in 1540. The river, hitherto, has had the longest unbridged stretch of any major stream in the United States, a slender suspension bridge being the only one over a distance of nearly 700 miles of continuous canyon. Because of the chasm, points in northern and southern Arizona, almost in actual sight of each other, have been more widely separated in point of time than New York and London, for, at certain seasons of the year, the desert roads leading to the crossing of Lee Ferry are unfit for wagon or automobile traffic. The

bridge is expected to cost \$200,000. The money has been furnished by the state of Arizona and from oil-royalty funds of the Navajo Indian reservation. At the point where the bridge will be built, the canyon is nearly 600 feet wide and 400 feet deep.

DOUBLE-EDGED PRUNING SHEAR MAKES CLEAN CUT 11723

Severing branches with pithy centers is sometimes a difficult task with ordinary pruning shears, as the twigs are likely to be bent and bruised without being cut.



This feature is said to have been eliminated in a pair of shears which has two cutting edges, the upper blade

sliding while it works, to produce a clean cut. There is also a hook on this blade to prevent the branch from slipping out. The cutters are easily removed for changing, and powerful leverage can be exerted by the strong spring grips.

Harley Specialty Co.
712 Western Ave.

Chicago, Ill.

ELECTRIC PAD PROTECTS FEET
OF AUTO PASSENGERS

2431



Electric Heating Pad Built with Drawstring and Designed to Fit Snugly about an Autoist's Feet

An electric heating pad, specially shaped to inclose the feet and fastened with a drawstring, has been brought out to protect automobile passengers from the cold. The pad is provided with a short extension cord, which plugs into a receptacle installed in the car just beneath the seat, the wiring from the storage battery being entirely concealed beneath the car. The pad is furnished with thermostatic control to prevent overheating, and a variable switch giving the choice of two temperatures. The same manufacturer also makes electrically heated driving gloves, which can be equipped either with a long extension cord, or permanently attached to the steering wheel, so that the driver can slip his hands into them or remove them at will.

CRAWFISH HELP CAUSE FLOODS
BURROWING IN LEVEES

2614

Investigation of the recent floods in the Mississippi valley by weather-bureau men has developed the fact that crawfish were a contributing cause to the disasters. Not

all the breaks in the levees were caused by high water running over the tops. Many were occasioned by seepage which is often increased by the burrowings of the crawfish. They dig straight through thick banks, water flows out, slowly at first, but with constantly greater volume as pressure inside increases, and before long, the small fissure has widened into a large crevasse. Patrols are maintained to guard against the breaks, but occasionally the crawfish win. Another contributing factor in the destruction of the levees was found in sand boils. In effect, these are merely springs where the land is sufficiently porous to allow the water to run through and boil out on the landward side. It is usually impossible to stop them by plugging, so circular dikes are built around them to trap the water. When it reaches the level of the river, it will cease to flow out, but the action undermines the levee so that it is less efficient under great strain.

FERTILIZER APPLIED WITH HOSE
FROM FAUCET HOLDER

2396

Watering and fertilizing the lawn or garden at the same time can now be done with a simple attachment connected to the supply faucet and to the hose. A fertilizer containing plant food in the form of various chemicals is held in the unit, which is simply a metal cylinder with two openings. As water rushes through, it washes the material with it. This is in the shape of a stick that drops down of its own weight as it dissolves, insuring a constant supply. An adjustable disk controls the strength of the solution and the speed at which it is dissolved. The sticks are odorless, and one pound of the material is said to be equal to about five pounds of ordinary fertilizer applied in the old way.



A Portuguese is said to have invented the ukulele about forty years ago.

Terride Specialty Co.
104 E. 1st St. Chicago, Ill.

Chicago Daily News
5/15/17

new York

119 1/2 Can. Osgood Taylor, City Com.
Herald Tribune, New York City

Games you CAN'T BEAT

THREE little walnut shells and a pea or two spot cards and a queen have done more to convince many thousands of people that the hand is quicker than the eye than any two games ever invented. For the shell game and three-card monte are two pastimes in which the "sucker" never has a chance.

The only time the player can beat either is when the professional deliberately lets him win to encourage others to try their luck, or to lead them on to making bigger and more reckless bets.

For those that have never seen it performed, the shell game is supposedly a contest in which the player matches his eyes against the shell man's nimble fingers. A small pea is placed on the table, one of three half walnut shells placed over it, and the shell man then moves the three shells about, changing their positions apparently aimlessly, and invites the player to point out the shell that covers the pea.

If a bet is made and the gambler wants to win it, the player always loses, for the pea is not under either of the three shells, so there is no chance of locating it. The pea itself is made of soft rubber and after a shell has been placed over it the gambler starts to move the shell by placing the forefinger on top of the shell and the thumb and middle finger behind it. As he moves it, the shell is tilted slightly at



the back, the flattened pea rolls under the edge and is caught between the thumb and middle finger and, as the hand is withdrawn, transferred out of sight between the first and middle fingers. From that time on until it is necessary to disclose it again, the pea remains there.

After the victim has turned up his chosen shell and found nothing under it, the gambler reaches for either of the other two, draws it slightly toward him, at the same time pressing the rubber pea flat, so that it will pass under the edge, and then lifts the shell and discloses the pellet.

If you play the game the shell man's way it can't be beat, though two ways of

winning have been discovered, neither of which meets the approval of the shell man, so, if you try them, he will quickly pack up his portable table and move on. One of the two was introduced by an expert shell man who once was picked for a victim by another pea artist. Having a rubber pea of his own in his pocket,



Why the Pea Is Never under the Shell; the Little Rubber Ball Is Snapped Back between the Fingers



One Monte Deal; the Queen, Bottom Card in the Top Picture, Is Held Back and the Nine Falls in Its Place

the potential victim slipped it under the shell as he picked it up, and the surprised gambler paid rather than expose the fact he had been tricked. The other method, which anybody can try, but which will only work once, is to clap your hand over two shells and announce the pea is under the third, forcing the gambler to lift it. His only recourse is to slip the pea under it and pay the bet, or else the two empty shells you have covered will expose the fact that the pea was not under either of the three.

Three-card monte requires more skill and better nerves on the part of the gambler, and for that very reason often will trap people who wouldn't fall for the rubber pea. It is played in numberless different ways, but practically all of the variations employ one face card, usually a queen, and two spot cards, usually of the opposite color from the queen, to make it look easier for the victim.

The trick is to point out the queen after the gambler has exposed the three cards and then thrown them on the table. It looks easy, but anyone with well-trained hands can defeat the eye every time. Every monte man has his own favorite way of dealing, or throwing the three cards face downward on the table. Some use one

hand, some use both, and others will lay the cards face up and then flip them over, using the edge of one of the other cards to do the turning. But regardless of the method used, the trick is always the same—the queen is replaced with another card by a method so simple that the onlooker doesn't see the substitution.

Take the "two-hand throw," for example. One of the spot cards is held in the left hand (which is called the blind) and the other two in the right hand, both slightly cupped and separated so that both are visible, the queen being lowest, or nearest the finger tips. Now, if a card is dropped from the right hand, then the one from the left, and finally the third card from the right hand, it stands to reason that the queen will be lowest, or at the bottom of the pile. The monte man repeats this performance a few times to show how easy it is.

Then the bets are made—and the bottom card turns out to be a spot, and the queen is on top! The reason is that the monte man has released the spot card from the right hand while keeping the queen between the finger tips, but has done it so quickly that the eye doesn't catch the move. At the same time the throw is made, the queen, which has been held between the thumb and second finger, is shifted to the first finger, replacing the spot card, and even examination of the hand fails to show anything wrong.

The "one-hand throw," which eliminates the "blind," is much more difficult to do, but more popular with the gamblers, because it is harder to detect. The three cards are held in the right hand, one end of all three against the thumb, and the other ends pressed against the first, second and third fingers, the queen being the lowest card, or the one against the third finger. The hand is drawn across the board in a quick sweep, dropping the three cards in a row. Apparently the queen should be the first card dropped, but actually is in the center, for the middle card is the first to fall.

The method is popular with the monte men because it can be varied at will, making the queen fall in any position. All that is necessary to drop a card is to lift the finger off its top edge, whereupon it is removed from the hands by the sweeping

motion across the board. In addition to letting the cards fall in any order desired, the monte man also has the advantage of changing the position of the queen in the hand, which helps mix up the victims.

One of the trickiest methods of confusing the betters is used with this same throw, the queen being held as top card with the two spots below it. The first spot card is dropped, and the gambler then, apparently by accident, lets the players get a quick flash at the middle card, which they see is a spot card, but he drops the queen instead, and then gives another quick flash of the spot card still in the hand. Having seen the glimpse of spots on the second and third falls, the players naturally assume the queen must have been the first card dropped, so they pick it, much to their sorrow.

The most deceptive form of three-card monte is performed on the table with the queen being face up at the start and the other two cards face down. All three cards are bent so that they are quite concave, and the two end cards are held by each hand. The card in the right hand is used

An Old Card Superstition That People Standing behind One's Back during Play Bring Bad Luck Is Well Founded

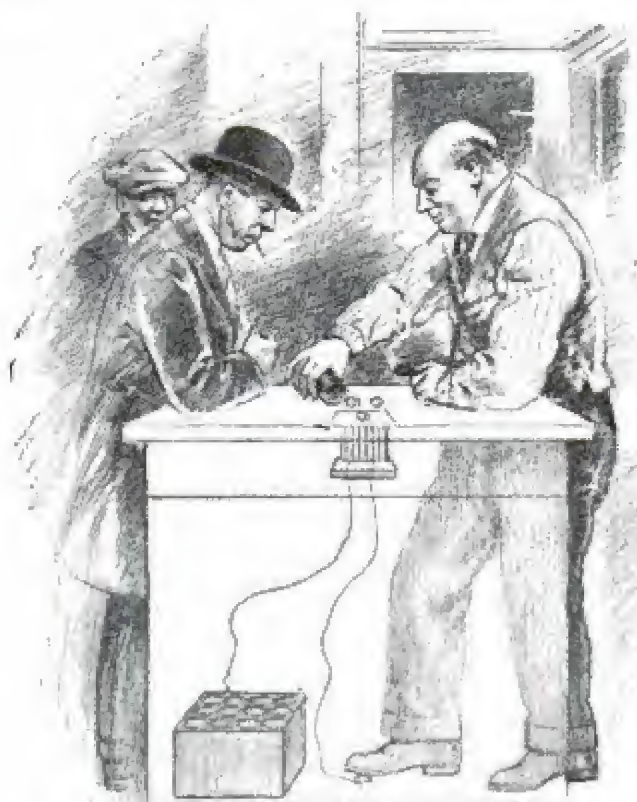


as a lever to turn over the center card, the queen, which falls against the left forefinger. Then the hands are drawn apart, and the end cards are laid on the table. Naturally the queen is in the center. But after the dealer has done the trick a few times and is ready for bets, a change takes place. As the queen falls on the left forefinger the right hand moves slightly to the left, the thumb and third finger catch the queen, draw it out and at the same time the right-hand spot card is released, to fall into the queen's place in the center. The movement is so natural and is accomplished so rapidly that the eye is completely fooled.

A variation, called "Mexican monte," is equally deceptive. The three cards are all laid face up, one of the spots then being used as a lever to turn the other spot face down, and then the queen, after which it is laid with



Dealing Two-Handed Monte, Showing How It Is Possible to Trick the Spectator by Changing the Order in Which the Cards Are Thrown



Dice Boards Which Can't Be Picked Up and Examined Are Always Open to Suspicion of Being Wired

the other two. But the supposed queen turns out to be a spot card, for the simple act of turning over the queen enables the monte man to switch cards. As the queen is tilted up, with the spot card held between the thumb and forefinger, the second finger is placed under the lower corner of the face card, and, just as it is about to fall, the queen is caught between the thumb and finger, while the extended first finger turns the spot card face down.

Should a suspicious player actually point out the queen, the monte man picks up a face card, uses it as a lever to turn the queen up, and works the same substitution, so that the spot card falls face up on the table.

Sometimes monte is played with three trick cards, though only the veriest amateurs use them. Instead of one queen, all three are spot cards, usually the ace, deuce and trey of the same suit. The deuce is a normal card, and is held at the bottom, but the other two, while having one and three spots respectively, have a fake pip at one end. The ace will have the usual "A" at one end and a figure three at the other, and the trey is arranged in the same way. Fanned and exposed in the usual way, held only by one corner, the fake

piPs are covered, while the correct ones and all the spots are shown. By simply reversing the cards in the hand the trey and ace apparently have changed positions.

Shell and monte men seldom work alone, usually having anywhere from one to six "cappers" to round up victims and start the play (in which the capper always wins).

There is no such thing as an honest professional card gambler, no matter what the game is. Despite the ban on gambling throughout the country, "mobs" of professionals work the cities and even small towns, while others ride the through trains and try to lure fellow travelers into a game. They are so numerous that the Pullman company has been forced to post warnings in each of its cars, with a realistic photograph showing one simple hold-out trick by which the gambler can fill his hand with aces at any time he desires.

One of the most used devices for cheating at cards is a "combination machine" which will supply the gambler either with holdouts or an entire new stacked deck. It is only necessary to hold the hands near the body to dispose of the old deck in the machine and have a new one pop into the hands, and in the same way three aces, previously extracted while shuffling another hand, can be brought into the hand whenever a pair is caught on the draw, and the betting by the victims makes an ace-full worth having.

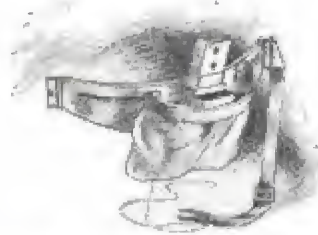
The combination machine is a belt affair, worn about the waist beneath the trouser band, and carrying a sack for the holdouts and a thread arrangement worked by spreading the legs, which raises the new deck or the cards previously held out, into the hand.

Another common gambling device is a "ring shiner," which looks like an ordinary finger ring with a brilliant set, only the set is really a tiny mirror. The ring is worn backward on the middle finger of the left hand, with the set turned inward. The deck is held in the left hand, so that it does not cover the mirror, and as each card is lifted off the dealer can catch a glimpse of its face, so he knows exactly what each player has.



The same company that makes the ring shiner also produces a white ink for marking cards, the ink matching the white finish of a card so perfectly that it escapes detection, while the gambler's carefully sandpapered forefinger can feel the raised surface of the ink and recognize the card from the touch.

Even dice games played over the cigar-store counter may be corrupted with crooked dice which fall only in one way when the proprietor steps on an electric button on the floor. A magnet hidden beneath the counter does the work.



Not all card sharps use marked decks, "cold decks" or holdouts. Work-

ing usually in pairs—always appearing as strangers when they meet in the Pullman smoking room—they have intricate systems of signals by which they can communicate to each other the contents of their hands, or, after one has dropped out of a hand, can overlook the victim's cards and flash their value across the table. The index finger of the right hand may be used, for example. When it touches the tip of the first finger of the left hand it means an ace, tip of the second finger a king, third a queen, fourth a jack, first knuckle of the first finger a ten, and so on. A cigaret held between the lips is often used in a bridge game to signal the best suit, meaning, in the left side of the mouth, clubs; center, diamonds; right, hearts, and in the fingers, spades.

LIFE DISCOVERED IN GEYSERS

Although they are always in hot water and likely to be incased in chalky material almost any time, various forms of animal life are found in the geysers and hot springs of the Yellowstone and other parts of

the world, according to Prof. Charles T. Brues. He found water beetles in ponds with temperatures of ninety to 100 degrees Fahrenheit, the larvæ of a species of horsefly at ninety-one degrees, a water bug at ninety-six degrees, snails at the same temperature, and certain kinds of worms at 120 to 124 degrees. In waters where the temperature reaches 200 degrees or over no life was found. Besides the question of heat, the animals have to solve the problem of chemical content in the water, the decreased supply of oxygen and the danger of the liquid becoming solid suddenly due to a drop in temperature and the high proportion of limestone and silica in solution.

2495

STONE BATHTUB FIVE FEET HIGH SHOWS STYLE CHANGES

Stone, instead of porcelain and metal, was the material favored for bathtubs in the days of the old Indian rulers and the basins were huge affairs with a crude stairway chiseled in one side so that the bather could get in and out of the tub safely. At Agra, India, is a specimen of "plumbing" as known in the time of Jahangir, one of the great moguls. The tub is five feet high, eight feet in diameter and twenty-five feet in circumference. It is fashioned from a single block of porphyry.



Huge Stone Bathtub Used in India Several Centuries Ago; It Is Made from a Single Piece of Porphyry



Tent Erected with Canopy Adjusted in Front; Setting Up the Frame inside the Canvas; the Diagram of the "Skeleton," Showing How It Looks in Rigid Position

POLELESS TENT EASILY PUT UP IN FOUR MINUTES

Supported by an easily adjusted frame instead of poles, a tent can be erected by one man in four minutes and is said not to stretch out of shape. The only poles used in the outfit are for the awning in front. The frame and tent are carried in separate bags to prevent damaging the cloth.

STOVE THAT FITS THE POCKET HELPS KILL MOTHS

What is believed to be the smallest stove in the world has been introduced in Germany in the form of a pocket-size unit for fumigating and deodorizing rooms. It burns gasoline, which is poured into wadding within an inner receptacle. Heat is transferred from a wire netting at the top to a safety cover and tube outside. Drops of perfume or chemicals are added to the fuel



for removing unpleasant odors or killing moths and other insects. To extinguish the stove, the inner chamber is simply turned upside down.

RAT-PROOFING OCEAN LINERS IS CALLED SUCCESS

About two years ago, eighteen steamship companies started renewed warfare against rats on seventy-three vessels. The government foreman of rat-proofing, one of the officials of the New York quarantine station, was called in, the plans of the ships were studied and extensive measures taken to combat the pests. So effective were the steps that ships which formerly trapped twenty or more rats on every voyage, now catch one in fifteen months or so, and on others, it was found that almost no rats were caught even before the protective measures were finished. The time to do rat-proofing is when the vessel is being constructed. Each compartment, section and room is designed so far as possible to be an isolated unit, but ships already built have been made practically proof against rats by careful alterations. The habits and movements of the rodents were studied and charted; then the work of eliminating their hiding places

NY Times 5/29/27

Mr. Kalischer & Co., City overstr. 27, Berlin, W. 35 Germany

2392

1922 Canfield Ave. W.
Electron Mech.

2595

2662

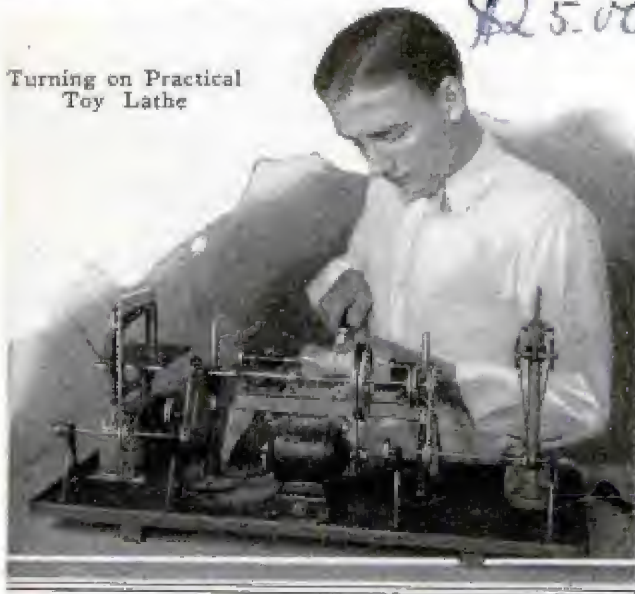
2233

began. All dead spaces were blocked off or done away with, flooring over bilges was made tight, metal casings placed around pipes, and metal collars or flanges at places where pipes entered walls. Metal cupboards and bins replaced wooden ones, double walls were removed for solid ones or, where this was impossible, metal screens were installed to block off spaces at frequent intervals. Rat-proof covers were placed on all food containers. Although the pests sometimes boarded the ships after they had been thus protected, they were soon exterminated as they could find few places to hide.

TOY WORK SHOP IS DESIGNED FOR PRACTICAL USE 2544.

A toy-sized woodworking shop, which actually runs and produces practical work, is one of the latest things for the boy, or, for that matter, for the model builder or others who need only comparatively small-capacity machine tools. It includes a wood-turning lathe, drill press and jig saw, all mounted on one wooden base and ready equipped with an electric motor, line shafting and the necessary belts, as well as several extra pulleys from which other tools can be operated. Despite its toy size, all the machines are well made and do excellent work within their limits. The lathe takes material up to five inches long and an inch and a half in diameter. The drill press will handle drills up to three-six-

Turning on Practical Toy Lathe



teenths of an inch, and the jig saw will cut boards up to three-eighths of an inch thick.

Knapp Electric Corp.



Museum Built on Balanced Rock, Which Can Be Moved by the Pressure of One's Hand

MUSEUM ON BALANCING ROCK IS MOVED WITH HAND

Truckee.
A push of the hand is sufficient to move a house foundation and all, in a California town. The structure is a small museum for Indian relics built on a balanced boulder which can be tipped back and forth by slight pressure against it.

POULTRY VICTIMS OF FLOOD RESCUED BY RED CROSS 2612

Human beings, generally, are the chief recipients of aid from the Red Cross in times of disaster, but in the recent floods on the Mississippi, animals were rescued and cared for in great numbers. At Opelousas, St. Landry parish, La., the largest temporary hen yard in the United States was constructed to feed 100,000 chickens driven from their roosts by the flood waters. The feathered refugees were fed by the Red Cross, as were 30,000 hogs, 10,000 mules and some 30,000 head of cattle. One of the problems arising from this work was to find the owners.

44th annual report of Comptroller General of Patents, Designs and Trade Marks for Great Britain



Gold Throne Once Used by a Persian Shah, Now Valued at \$15,000,000, as It Appears in Display Case

GOLD THRONE WORTH FORTUNE NOW IN PUBLIC EXHIBIT

Fairy stories of Oriental splendor do not seem so far-fetched in view of the rich relics that have finally been exhibited to the public from a treasure house long kept guarded by the Turkish government. One of the most striking objects is a gold and jewel-encrusted throne of one of the shahs of Persia. It is valued at \$15,000,000.

INCREASE IN BRITISH PATENTS OVER SEVENTY PER CENT

More than 33,000 applications for patents, trade-marks or designs were filed in Great Britain last year, according to the annual report, an increase of seventy-seven per cent as compared with the number received in 1925. There were seventy-one fewer applications from women inventors. Receipts from the office totaled \$2,440,760, an increase of \$60,540 over 1925.

COTTON IS PICKED WITH SLEDS

Old-time negro cotton pickers with their baskets are giving way in Texas and other sections to a mechanical picker that is mounted on a sled. It has long "fingers" which reach out and strip the bolls from the stalks, passing them back to a wooden trough where they are drawn into a rear compartment as the sled moves forward, for gathering and carrying to the scales. Although cotton picked by this method does not bring as high a price as that picked in the old way, improvements in the outfit are being made, and with it one man can

gather as much cotton as twenty pickers working by hand. This saving in labor more than makes up for the difference in market price, growers believe.

STEAM BOILER CLEANS AUTOS WITH SPRAY MIXTURE

To simplify the cleaning of automobiles, an automatic steam generator, recently introduced, has safety and automatic features intended to insure a high quality of performance and operation at a minimum of expense and trouble. It is so arranged that should the water get too low, the fire under the boiler is shut off, small coils prevent danger of an explosion and steam

is said to be generated a few minutes after lighting the fire. To aid in cleaning, a soap solution is mixed with the steam and delivered with it from a separate tank. Pressure and temperature are accurately controlled to prevent damage to the automobile finish and insure a thorough job.



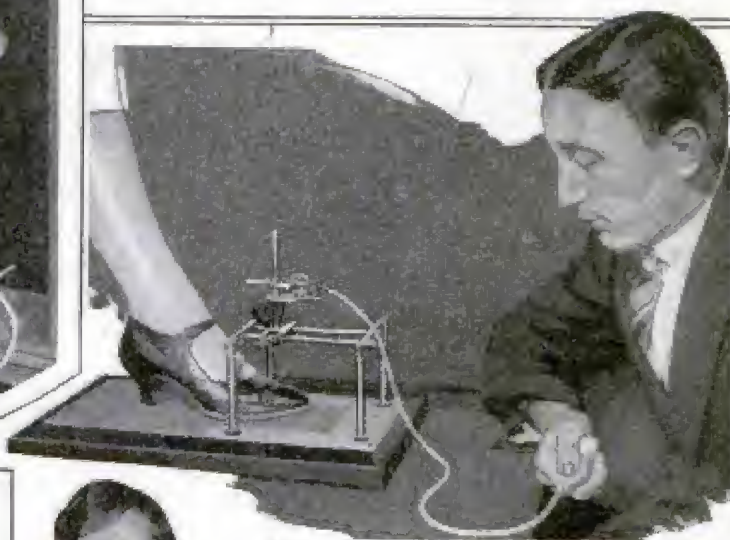
Steam-Cleaning an Automobile

Harley Boiler Works
Caled

FITTING WOMEN TO RIGHT NICHES FOR A CAREER



The Machine Above
Determines One's
Capacity for Work,
Carefulness and
Willingness

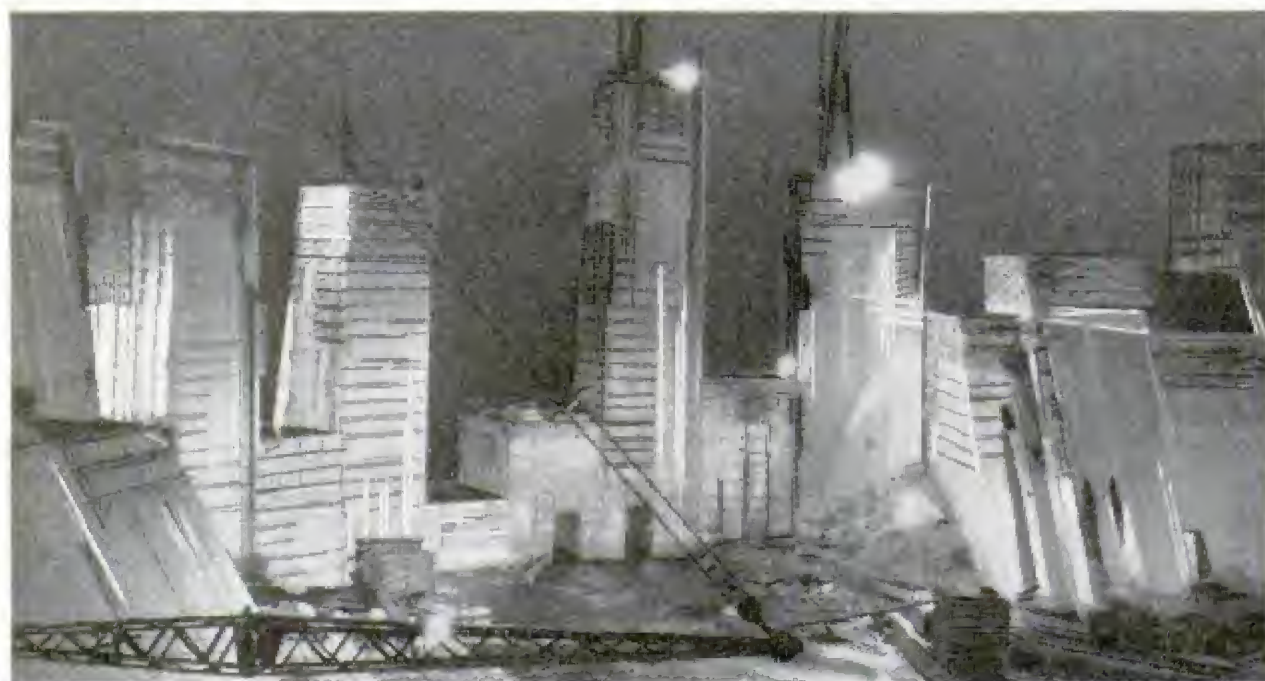


German Scientists Have
Perfectd a Number of Ma-
chines to Test the Abilities
of Women to Fill Various
Positions; the Outfit Above,
Which Tests the Sensitivity
of the Foot, Is Used in Sev-
eral Industries Which Em-
ploy Large Numbers of
Women at Tasks Requiring
Quickness and Agility; at
the Left Is a Test for Sen-
sitivity of the Fingers



The Nerve Drain of Doing
Monotonous Work Over and
Over Again Is Measured by
This Apparatus

Henry Miller



Like Some Weird Metropolis of the Future, the Towering Concrete Forms of This Huge Dam Stand Out under the Floodlights Which Illuminate the Work at Night

BIG ARCH DAM OF CONCRETE THOUSAND FEET LONG

Nearly 1,000 feet long on top and 196 feet high, the Santeetlah dam in North Carolina will contain 195,000 cubic yards of concrete when completed. The central portion is an arch design, five feet thick at the top and about forty at the bottom. Adopting this form of construction saved nearly 40,000 cubic yards of material, in the opinion of engineers, although it is a little longer than a straight dam would have been. During the building, as much as 20,000 cubic yards of concrete were placed in the forms in one month.

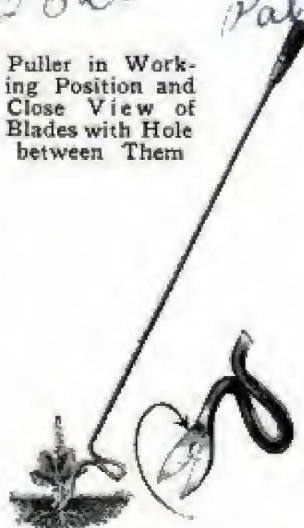
QUEEN OF SHEBA'S GOLD MINES FOUND IN ARABIA?

The lost lands of Ophir, where the queen of Sheba obtained the thirty-three tons of gold and jewels she gave to King Solomon, have been found in southern Arabia, 400 miles east of Aden, according to Comm. C. Crauford, a British naval officer who has searched for them twenty years. He reports that gold mines and precious stones are in the ground there, a veritable Transvaal of wealth, and that identification of the territory was made by means of inscriptions and the ruins of a temple. The city has a harbor to the north and a river

which gave wharfage to the seaport, but a thin ribbon of coral sand, drawn across the harbor mouth, apparently was one of the factors that strangled the life of Ophir. In recent years, the land of mystery was believed to have been located in East Africa, as popularized in "King Solomon's Mines" by Rider Haggard. But research showed that the ruins of what were supposed to have been temples of the queen's day were but 300 or 400 years old.

LONG-HANDLE GARDEN WEEDER 2326 SAVES STOOPING

Puller in Working Position and Close View of Blades with Hole between Them



Dandelions and other weeds are said to be easily removed from lawns and gardens with a combination puller and cutter now on the market. It has sharp, pronged blades with a hole between them to help catch the small weeds. The handle is forty-two inches

long, so that the user need not stoop. The tool is also suitable for pruning bushes and may be employed in difficult places.

Daily Mail 5/12/27

Mr. John W. Young, Holyoke, Mass.

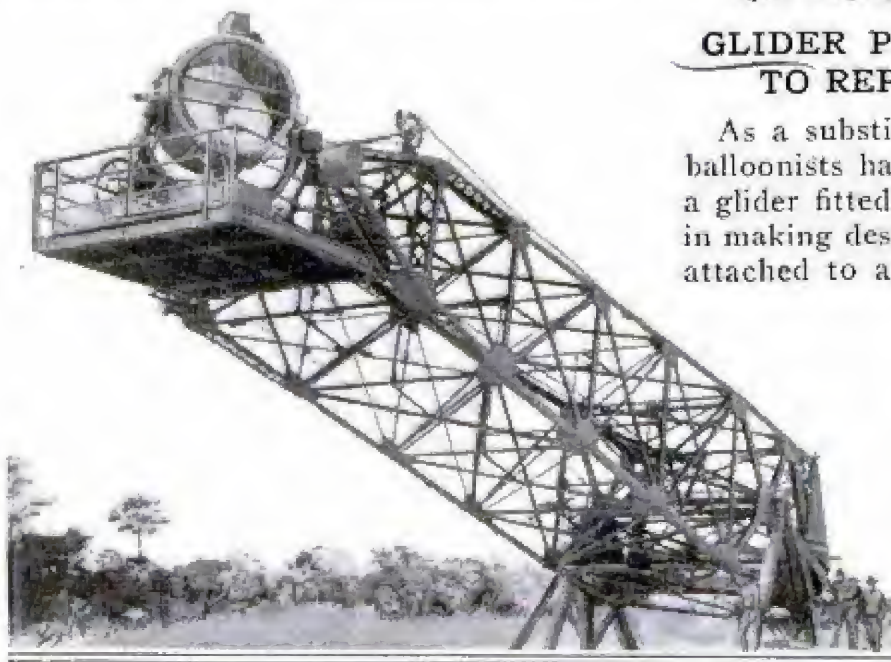
Sold by Sheep Service
30253, Highland Station,
before Royal United
Service Institution

FLUTE MADE OF GOLD YIELDS IMPROVED TONE 2621

When special effects are desired in certain passages of their selections, the Boston symphony orchestra sends to Cincinnati to borrow a golden flute, belonging to Prof. Dayton C. Miller, experimenter on ether and sound problems. The instrument has a curious, rich tone, not equaled by any other. The explanation, according to Prof. Miller, is that the density of the metal in the tube improves the tone quality, and the relative nature of the golden flute's sound and that of other flutes has been determined by motion pictures of the waves produced. Prof. Miller has a collection of more than 700 flutes and is thinking of having one made of platinum to determine if it will produce a still finer note.

LIGHT TOWER THAT DISAPPEARS HELPS GUARD COAST 1956

For use along the seacoasts, a disappearing searchlight tower has been adopted by the government. In two minutes it can be raised from a nearly horizontal position to a height of 200 feet, and, when not in service, is lowered and concealed within a portable shed on rollers. With electrical equipment, it weighs about 8,000 pounds. The towers will not only be of service in case of military necessity, engineers believe, but will also aid in determining the location of vessels in distress.



Disappearing Searchlight to Aid Coast-Defense Ports



Attaching the "Parachute Propeller"; It Is Intended to Spin, Keeping the Flyer from Abrupt Descent

GLIDER PROPELLER PLANNED TO REPLACE PARACHUTE

As a substitute for parachutes, French balloonists have been experimenting with a glider fitted with a horizontal propeller in making descents. The arrangement was attached to a balloon basket in one test and then released at a height of 1,300 feet. The blades revolved rapidly during the downward course, helping to break the force of the fall just as a parachute supports the weight fastened to it. It fell at about the same speed as an equivalent load with a parachute would have done.

Carl E. Persson, Bloomington, Ill

2/45-

TIME and things



Added Service Is Derived from This Vacuum Cleaner, Which Has Revolving Brush for Polishing Floors



Safety Plug for Electric Iron: It Automatically Shuts Off Current at Danger Point and Has Button Heat Control



No More Rocker Scratches on Baseboards; the Rubber Tips Protect the Wood, and the Ankles, Too



Bottom for Kettles to Keep Food from Scorching; Turn of Center Ring Makes It Larger or Smaller



Mop Wringer without Roller, Adjustable to Different-Sized Pails; the Net in Center Holds Rag for Squeezing Out Water

MONEY SAVING for Your Home



Metal Ring for Gas Stoves Focuses Flame Where It Will Do the Most Good, Speeding Up Cooking and Saving Gas; It Also Protects the Sides of Kettles



One of the Latest Units in Electric Heating Pads, a Big Blanket for the Sleeping-Porch Bed; It Can Be Strapped to the Occupant



Special Wiring Is Not Required for This Compact Electric Range with Roomy Oven, Racks and Grid for Frying and Broiling besides Place for Percolator; Current Is Supplied through a Convenient Wall Socket

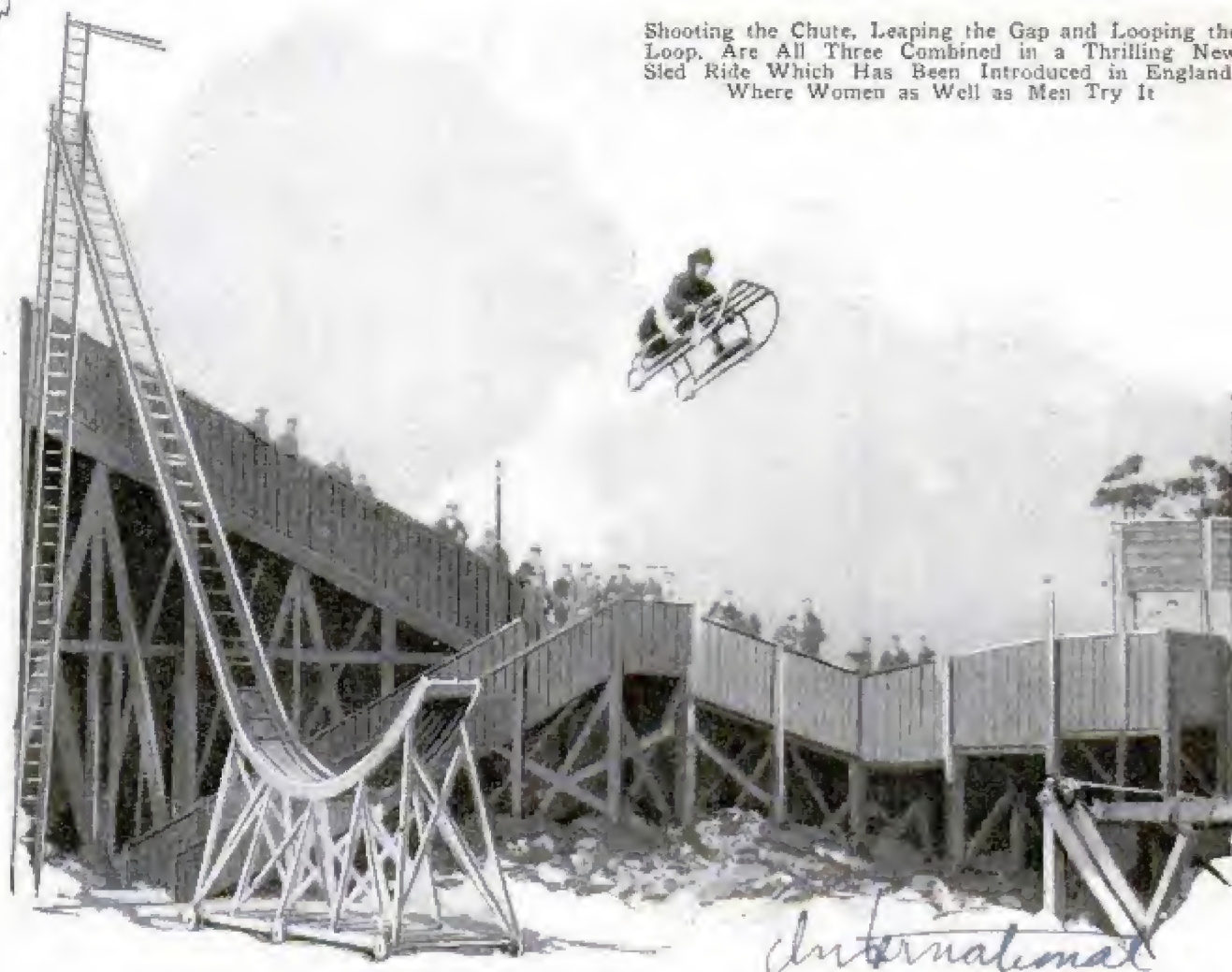


Large-Toothed Kitchen Knife Cuts Bread and Cake Easily; Old Blades May Be Shaped in This Manner, to Make Them More Useful



Cakes Can Be Watched While Baking in This Pan for the Top of the Stove; It Has a Mica Window and Small Hole for Inserting a Straw

Shooting the Chute, Leaping the Gap and Looping the Loop. Are All Three Combined in a Thrilling New Sled Ride Which Has Been Introduced in England, Where Women as Well as Men Try It



RIDING ON SOMERSAULT SLED LATEST THRILL IN SPORT

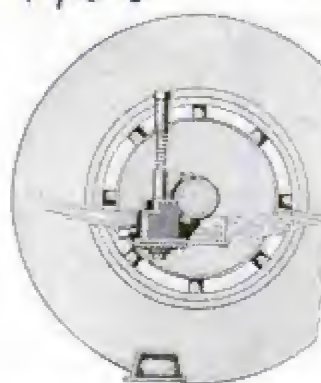
"Shooting the chute" on a sled that turns a somersault in mid-air and lands upright on a large net, is the latest outdoor sport introduced in England. The sled and rider start from the top of a steep incline. At the base, is an abrupt tip-up that turns them over as they shoot up and forward into the net, which is placed the correct distance from the bottom of the slide.

NEW SOURCE OF RUBBER SEEN IN AFRICAN TREE

Renewed interest in the possibilities of the euphorbia tree, which grows in great abundance in southern Africa, as a source of rubber, is reported from that district. For forty years or more, the species has been known as a producer of latex and resins, but active cultivation, contemplated shortly before the war, was halted and little has been done until recently, when samples were sent to London, New York

and the bureau of standards. According to a German chemist, about three gallons of latex of pure-white color were extracted from twenty trees in two hours. It proved to have a high rubber content and the resins were suitable for varnishes.

AUTO JACK IS ALWAYS IN PLACE 1936 ON THE AXLES



hard-surfaced roads. The jack may be fixed to either front or rear axle, and spares the motorist soiling of his clothing and the usual difficulty encountered, particularly in placing a jack under the rear.

Permanent. Attached to the automobile axle, a jack operated by a small handle, is always ready for duty and saves the work of adjusting. A special base is provided, but this is not needed on

Option obtained by Premier Rubber Corp. Draver Inf. Co.

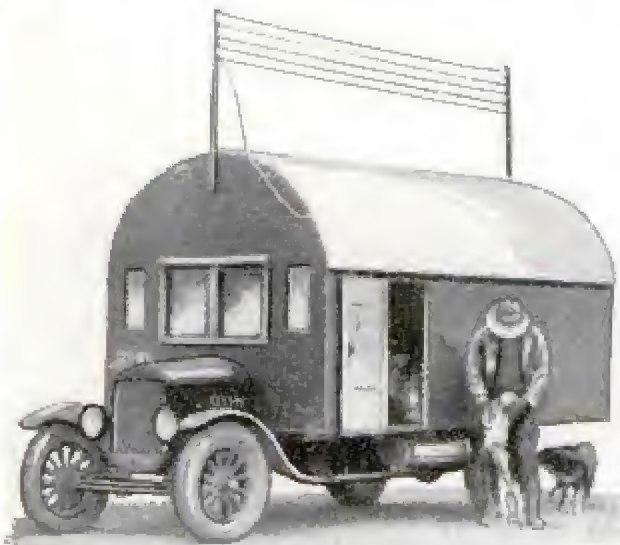
John. A. Cross
York. Pa 465

BIRD PUNCTURES PLATE GLASS IN FLIGHT OVER POOL

Mistaking a large plate-glass window in front of a swimming pool at Banff, Alberta, for an open passage, a partridge flew into it, breaking the huge pane and killing itself. The force of the flight was shown by the fact that the bird passed entirely through the glass and partly across the large room within before it fell. It cost \$400 to repair the damage.

PALACE CAMP OF SHEEP RANGE HAS LATEST LUXURIES

Auto camps with radio, electric lights, comfortable disappearing beds and other furniture, have come to replace the horse-drawn wagon used by sheep herders. It is built on a small auto truck, specially rigged for climbing steep hills or wallowing through creeks and can go almost anywhere a team can go. To a degree, it has replaced horses, which are now used in some camps merely for the actual herding. The body is fitted with bins for water, gasoline and grain, and when new supplies are needed, the truck is quickly driven to the nearest station and back again, in much less time than was required for the journey with horses. Some cars have glass windows in front so that the driver can sit comfortably inside to steer, and others have front and side doors with special steps, for use when stops are made for a day or more at a time.



Modern Sheep Tenders' Camp in the West Complete with Electric Lights and Radio



Cross Braces Grafted into a Tree, to Give the Limbs Added Resistance to the Wind

TREE IS BRACED BY GRAFTING TO RESIST WINDS

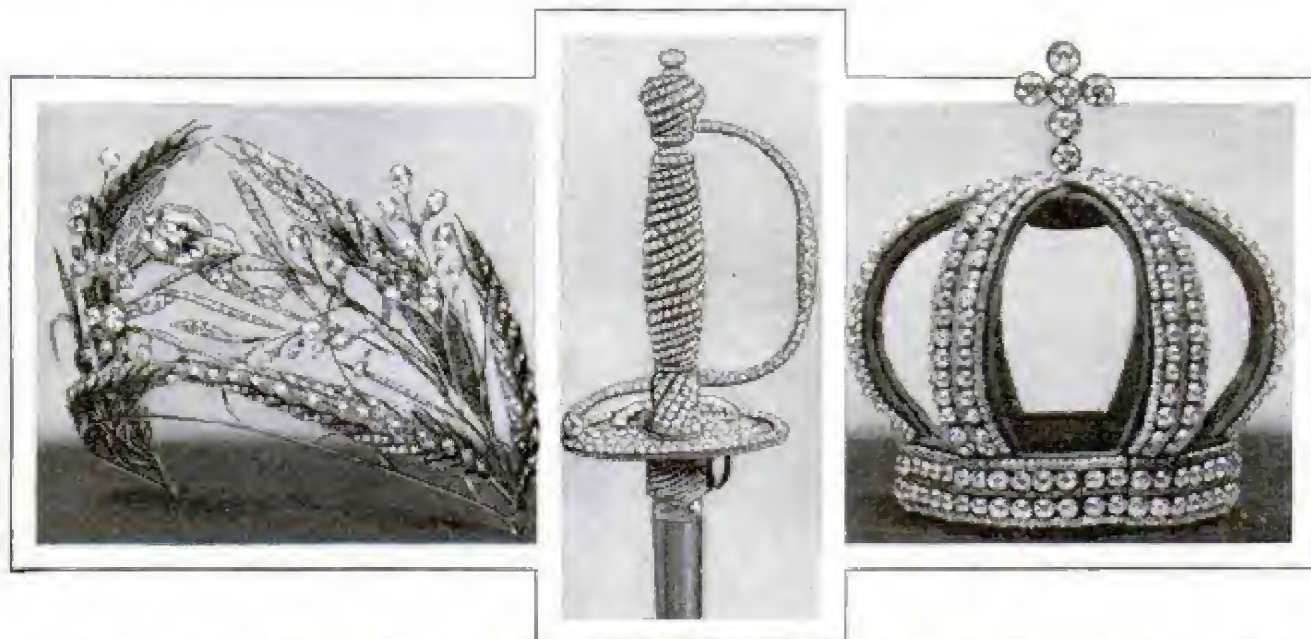
Interwoven at six different points by grafts, the three main limbs of an apple tree have been strongly braced to prevent breaking in storms. The supports are said to be more effective than props and also to help hold up the branches when they are loaded with fruit. It is suggested that the method might profitably be adopted in other orchards.

COLORS "PAINTED" IN FLOWERS WITH CAMEL'S-HAIR BRUSH

By transferring grains of pollen from one flower to another with a camel's-hair brush, Alois Frey, a California naturalist, has produced many blossoms of unusual colors and fragrance. He has been doing the work for more than twenty years and already has classified 1,200 separate creations, besides twenty-odd distinct shades. He has a freesia bed containing 10,000,000 plants and maintains a glass-inclosed workshop where thousands of bulbous plants are specially cultivated from selected seed. The new varieties are the result of careful study of the colors, plant size and foliage of different specimens.

Cont. Harrison C. Merrill San Francisco
386 N. Fourth East

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Three of the Former Russian Crown Jewels, Recently Auctioned in London by the Soviet Agents; the Tiara Was Designed for the Wife of Paul I, and the Jeweled Sword Likewise Was His

Secrets of a King's Jewel Safe

Strange Tales of World-Famous Gems in the Tower of London, Which Baffles Cracksmen

By HAROLD T. WILKINS, *Esq.*

EVERY night, inside the gray stone walls of the 900-year-old Tower of London, an interesting ceremony takes place. It has been performed without a break for the last seven centuries. A yeoman of the guard, wearing a picturesque uniform as old as the days of Henry VIII of England and carrying a bunch of massive keys, goes round the castle, escorted by a detachment of the soldiers of the tower garrison.

Before him walks a bugler carrying a lantern, behind him an officer of the guard. The outer gates are locked one by one, and then the chief warder approaches the massive tower in which are kept King George's crown jewels. A sentry on duty, outside this jewel house, stops pacing up and down and lowers his bayonet.

"Halt, who goes there?"

"The keys," answers the chief warder.

"Whose keys?" replies the sentry.

"King George's keys," says the warder.

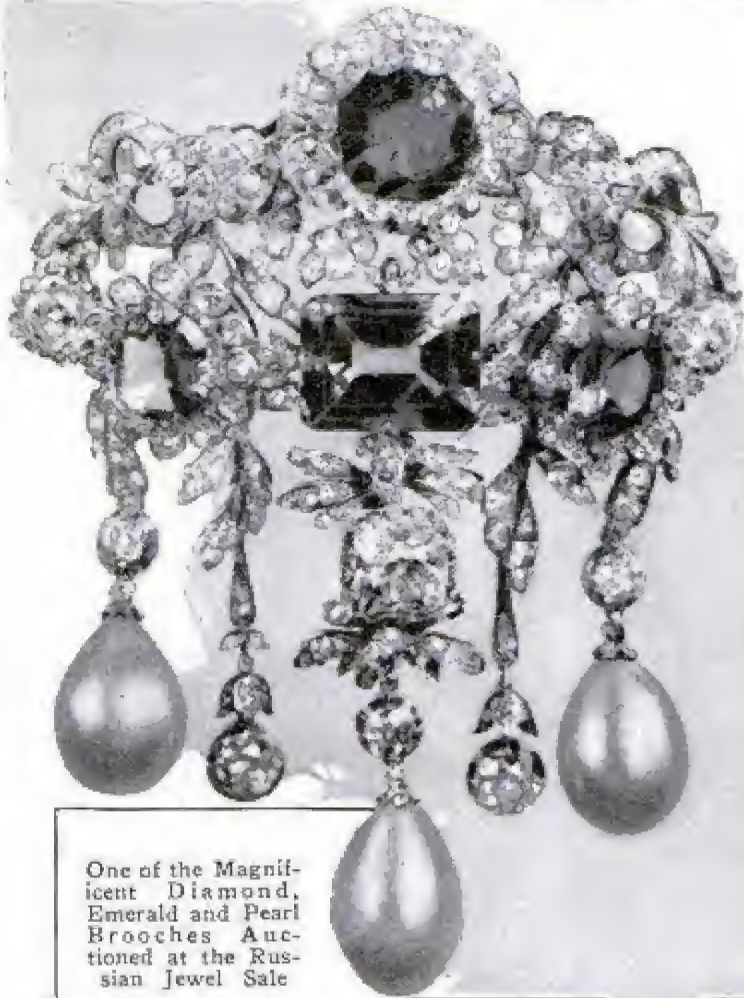
"Pass, King George's keys!" The guard shoulders his bayonet, and continues his sentry-go. Inside is an amazing collection of blazing diamonds, glowing blood-red rubies and jewels set with sapphires and

emeralds, the cunning work of centuries of long-dead goldsmiths of Europe and the east, who were masters in the art of creating beautiful things of gold and silver.

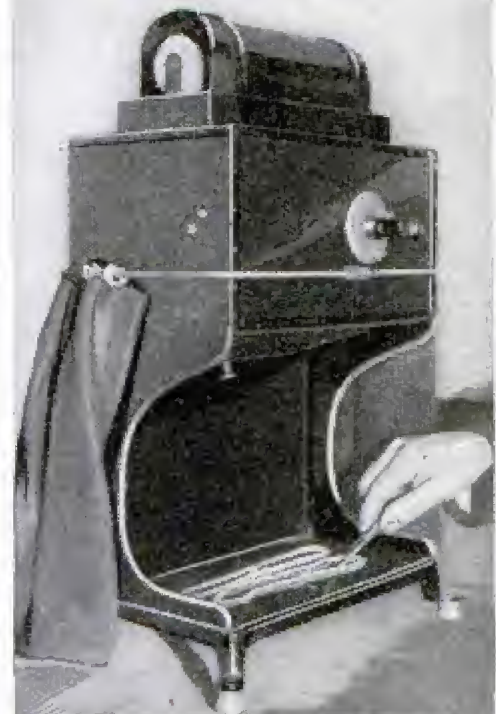
Next to the vaults of the federal reserve bank, at New York, and the nightly submerged bullion room of the bank of England, the jewel house in the tower is probably one of the most strongly guarded places in the world. Its walls are eight feet thick, the windows are heavily barred and there is only one exit. Sentries mount double guard all night outside, and police, soldiers, detectives and yeomen of the guard watch all the day. The crown jewels are kept inside an octagonal glass case, protected by slender steel bars and built around a circular base. After the jewels of St. Patrick were stolen from the royal castle at Dublin, Edward VII called in locksmiths, and they invented this burglar-proof casement of steel and glass.

Burglars and crooks, watched by detectives, have come inside the jewel house, along with honest visitors, and have flattened their noses against the grille in the circular cell, but they have had to give up the idea with a sigh. At the slightest tam-

1948



One of the Magnificent Diamond, Emerald and Pearl Brooches Auctioned at the Russian Jewel Sale



Genuine Pearls Can Be Tested by Their Fluorescence When Exposed to Ultraviolet Light from the Machine Shown Above



Another Gem Detector to Pass on Clever Imitation Pearls Has Been Invented by M. Rosenthal, a German Expert, at Left



An X-Ray Outfit Designed for Testing Precious Stones Is Shown Above; Artificial Jewel Makers Are So Clever Experts May Be Misled



England's Jewel House in the Tower of London Is Barred to Photographers, but Resembles This Armory in the Near-By White Tower

pering with the grille of the casement, alarm bells would ring all over the tower, and the outer gates of the fortress would automatically clang to and shut fast. Simultaneously, the thieves would find themselves imprisoned by the mechanical closing of the doors, and steel shutters, invisible to the ordinary sight-seer, would automatically close over the grille of the glass casement and convert it into a great octagonal steel safe.

Many of the wonderful gems in the jewel house of the tower have a romantic past more thrilling than fiction. No jeweler, living or dead, could give the value of the crown jewels and the regalia, which have been kept in the Wakefield tower since the

seventeenth century. Thirty million dollars would be a low estimate. There is a ruby as large as an egg, which belonged to the Black Prince in 1367, and was worn in the coroneted helmet of Henry V at the battle of Agincourt.

The first thing to dazzle your eyes, as you enter the jewel house, is Queen Mary's crown, lying on its white satin bed. Set in it is the famous Koh-i-Noor, a thousand-year-old diamond burning in the jeweled turbans of princes of the orient.

This crown is the personal property of Queen Mary, and is studded with hundreds of diamonds set by the court jewelers. One big square diamond blazes in an arch, and at the top glitters a large drop-shaped stone. These gems are called the "Lesser Stars of Africa," and are part of the great Cullinan diamond given to Edward VII by the Transvaal government.

The Black Prince's ruby, now in the crown of King George, and worn at his coronation in Westminster Abbey, has a strange history. It is truly blood-red. Don Pedro, of Spain, killed the Moorish king of Granada to get this jewel, and then, frightened by its influence, gave it to the Black Prince of England for help in his wars. A hole bored through the top shows that, in ages long past, it was worn as a pendant hanging from the neck of some eastern potentate who got it from the mines of Burma. This ruby saved the life of King Henry V at Agincourt, when he wore it as a diadem. It deflected a smashing sword cut aimed at his head by the Duc d'Alencon.

When Charles I was beheaded at Whitehall, London, the British republican government of Cromwell ordered the insignia of royalty to be destroyed and the gems to be sold. The Black Prince's ruby was purchased for \$20 by some unknown buyer who sold it back to Charles II, when that monarch came to the throne. The ruby has a gold backing, so ancient that no modern jeweler will undertake to remove it, as that would ruin the gem.

The famous Koh-i-Noor (Mountain of Light) was picked up on the diamond fields of Golconda (southern India) about 250 years ago. The great mogul emperor of Delhi, Shah Jehan, heard of it, and got it by bribery from the king of Golconda. Then the cavalry of a Persian shah swept

through the Khyber pass on to the plains of India, in 1739, captured Delhi, and tried hard but in vain to find the Koh-i-Noor. One of the Mogul's wives, however, betrayed the hiding place of the jewel.

But the Persian was murdered by an Afghan of his bodyguard, who fled with the diamond to the wild and inaccessible mountains of Afghanistan, where he founded a dynasty. One of the Afghan's descendants lost his throne and fled to Lahore in India, where the Indian maharajah, Runjeet Singh, demanded the Koh-i-Noor as the price of shelter. Then the British invaded his country and captured the Koh-i-Noor in battle with the Punjabi army. So it came into the hands of Queen Victoria. This gem is worth about \$800,000 and weighs 106½ carats, although it was originally 1,000 carats. The spell of its evil luck is broken if a woman wears it, runs the legend, so the Koh-i-Noor is Queen Mary's stone.

One-half of the well-known Cullinan diamond, or "Star of Africa," burns as a cushion-shaped brilliant just under the Black Prince's ruby in King George's crown. The Cullinan diamond, called after its finder, and originally one and a third pounds in weight, four inches long and two and a half inches deep, was picked up by chance in 1905 in a South African mine. The finder dug it out with a pocket-knife. A tremendous volcanic upheaval had sliced it in half. For fourteen years, search was made for the missing half, which was found in October, 1919, in the Premier mine, Johannesburg, but the crusher smashed in pieces what was originally a 1,500-carat gem.

The other half of the great diamond was divided into two parts—the "Stars of Africa"—and set in the crowns of King



London's Famous "Beefeaters," or Yeomen of the Guard, Protect the Crown Jewels with These Ancient Weapons

George and Queen Mary. Before being sold, the Cullinan stone was insured for \$7,500,000, but nobody could or would buy it, so the Transvaal government bought it for a tenth of that sum and presented it to King Edward VII. Lying on a bed of satin, under the octagonal casement in the crown-jewel house, is a model of this diamond, looking like a big rock crystal.

Diamond cutters told the king that it was impossible to cut and shape a gem of this size into a single brilliant. They said it would have to be cut along the lines of natural cleavage into four parts—two big gems, and two smaller brilliants. Costers, the famous diamond cutters of Amsterdam, did the work at the tower, and the steel chisel and mallet used by them are still preserved there. One slip of the chisel would have ruined the great diamond and shattered it into fragments with a total loss of millions of dollars.

The largest piece was made into a pear-

shaped brilliant and set in the king's scepter. The next largest, a cushion-shaped brilliant, is now in King George's state crown, under the big ruby. They are both bigger gems than the famous Koh-i-Noor. Queen Mary's crown has the other parts of the Cullinan diamond. The king's stones cut from the Cullinan weigh 516 carats and 309 carats, respectively, and the queen's stones weigh ninety-six carats and sixty-four carats.

Lying by King George's crown is that of Queen Victoria, worth \$1,500,000. Silver hoops and a brilliant band, sparkling with 3,000 diamonds, 341 pearls and great sapphires and emeralds, arch over a cap of purple velvet in the crown. On the summit of the arch is a mound of 548 diamonds and a cross formed of four very large sapphires and four diamonds of similar size. This crown weighs two pounds.

Every king of England must have the archbishop of Canterbury place on his head, at his coronation, the crown of England, which weighs five pounds. It stops on his head for a second, and is replaced by the state crown, weighing nineteen ounces. The crown of England is of mas-

sive gold, jeweled with diamonds, rubies and sapphires, and is used only once in a king's or queen's lifetime.

A very valuable jeweled state sword, of which one gem alone (an emerald), is worth \$15,000, was lost after the coronation of Queen Victoria. Years after, it accidentally turned up in a gun case, at the back of an old cupboard in the tower. This sword is a blade of real Damascus steel, so finely tempered that it can be tied up into a knot without snapping. Its golden scabbard is set with rich gems and it has a hilt studded with sapphires, rubies and diamonds, and a very rare and costly yellow sapphire.

Have the crown jewels ever been stolen?

The famous Col. Blood headed a band of thieves who broke into the jewel house and got away with the crown jewels. They slipped the royal crown of England into a bag, battered and bent the gold rims and arches, and broke the gems out of their settings. Diamonds, emeralds and rubies fell out of the crowns and rolled about on the floor of the jewel house, and when the thieves were captured, the big ruby of the Black Prince was found at the bottom of



The Tower of London from the Air, with London Bridge in the Foreground; the Jewel Tower Is the One Behind and Slightly to the Left of the Right End of the Bridge

San Francisco Calif.

the pocket of one of them. King Charles II, who was on the British throne at the time, rewarded Col. Blood for his theft with a pension of \$2,000 a year.

Once the crown jewels were kept in Westminster Abbey, but one of the Edwards found that they were being stolen, so he shifted them to the tower, appointed a keeper of the regalia, and surrounded them with soldiers and battlements. The old-time jewel house was in the haunted Martin house. It was guarded by a single sentry, but he refused to go on duty one night because he said he had seen a ghost.

The old jewel house was a strong cage with bars through which the jewels could be seen under the light of dim lanterns by folk who had passes and paid a fee to look at them. It was set on fire and burnt to the ground in 1843, and the crown jewels were saved by a sergeant and yeoman who threw the jewels onto the parade ground without useless ceremony.

During the late war, the tower was a target for the bombs of German airplanes flying over London. Bombs hit the walls, the river and places all around the fortress. One bomb fell into the tower moat, another missed the crown-jewel house by a few yards and fell into the Thames, close to which the present jewel room is located.

Just before, the crown jewels had been quietly taken in one of King George's private autos and deposited in Windsor castle, whence they came back after the war was over.

CHEMICAL AS CHECK PROTECTOR FOILS INK REMOVERS

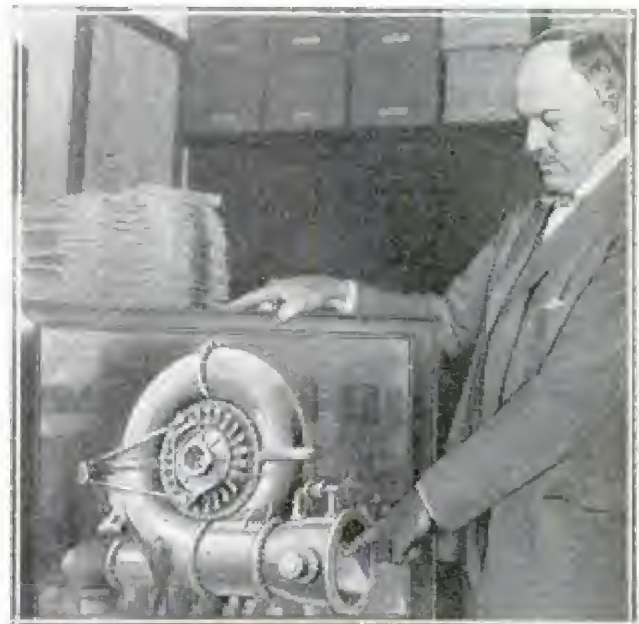
Altering checks by means of ink eradicators is sometimes successful, but this method, as well as others, is said to be unavailing after the paper has been rubbed with a little stick of chemical which resembles paraffin. It is reported to coat the paper with a substance impervious to ink removers and may be used also for safeguarding legal documents.



New Check Protector Which Is Rubbed over the Paper After the Check Is Written

LONGER POWER LINES PROMISED THROUGH CONDENSER SYSTEM

Cheap transmission of electric power over long distances is promised through



Inventor with Picture of His Rotary Condenser, Designed to Keep Power-Line Voltages at Maximum Peak

the invention of a new type of rotary condenser, the manufacturing rights to which have been taken over by one of the largest electrical plants in the world. Transmission of power across the continent without loss of voltage is possible through the device, engineers say. Line losses have been the most serious drawback to the growth of super-power systems, since, even with tremendous voltages at the generating plant, it was only possible to cover a few hundred miles before the energy losses became so great as to threaten the profits. The new converter is designed somewhat like the gyroscope used on ships for steering and stabilization, the revolving rotor, which is air-cooled, keeping the line voltage up to a constant point.

Popular Mechanics magazine does not publish the name of the maker or seller of any device described in its pages, but this information is kept on file and will be furnished, free, by addressing our Bureau of Information.

Patents acquired by Westinghouse Electric & Mfg. Co.

Soldstein Bros, Santa Cruz, Calif.



Sidewalk in Berlin Made of Bricks Formed of the Slag Left When Refuse Is Burned

BRICKS MADE FROM RUBBISH USED FOR PAVING

Refuse that cannot be reclaimed is burned in Berlin and the slag resulting is formed into bricks. These have been found excellent for building, paving and other purposes, as they are durable and readily worked.

MILLION DOLLARS IN WHALE OIL CAUGHT IN THREE MONTHS

Last February, Popular Mechanics described the Norwegian steamship "C. A. Larsen," the boat that "swallows whales." It is fitted with a big drag tunnel through which the whale is drawn directly into the ship where it can be cut up, saving delays and extra handling. Recently, the steamer arrived in New York with a cargo of oil in her hold valued at \$1,000,000, the result of a three months' expedition in the Ross sea, about 700 miles from the south pole. The "Larsen" and her sister ship, the "Sir James Clark Ross," are said to be able to do in three months what the old-time

fleets did in three years, each of the vessels being equal to about 100 of the old-fashioned type. Six 200-ton "killer" boats joined the "Larsen" south of New Zealand for the whaling. These craft carry harpoon cannon and are sometimes dragged along by the whales for miles. Skippers of the killer boats are paid on commission, occasionally making as much as \$18,000 in three months. The prize pay on the recent trip was \$10,000. The crews work night and day, since, at the whaling season, there is no real night at that extreme southern locality. Most of the whale oil is used for the manufacture of fine soaps and similar products, and the bone is now ground up for oil, its use for corsets and whips having practically vanished, owing to the gradual disappearance of horse-drawn vehicles and to changing fashions.

DUMMY AS TRAFFIC POLICEMAN DIRECTS AUTO TOURISTS

On the supposition that automobile drivers will pay attention to a policeman when a sign would be unnoticed, officials of Iron Bridge in Ontario, Can., have erected a dummy traffic supervisor at the intersection of two busy highways. Directions are indicated by the outstretched arms, and the humorous make-up of the figure seldom fails to amuse the traveler.



Dummy Traffic Policeman Used as a Road Guide in an Ontario Town

How to Use Rosin-Core Solder

By P. C. RIPLEY

EXHAUSTIVE research on the part of radio engineers and manufacturers covering the entire field of fluxing agents has resulted in the endorsing of rosin as a

sufficient heat for the lightest soldering operations. Lack of capacity in the iron will be disastrous to good soldering and this also applies to the plain copper. "Rosin



deoxidizer for radio soldering, when properly used. When improperly used, however, it is apt to show rather discouraging results, and the worker then condemns the solder, instead of placing the blame where it really belongs, on his own lack of knowledge of how to use it.

The first important thing is the selection of the soldering iron, and there are two types to consider: the conventional copper which is heated in a fire or stove, and the electrically heated iron. Each type has advantages that recommend it, but the latter possesses the distinct advantage of maintaining a more or less constant heat, eliminating loss of time required for reheating the ordinary copper. The purchaser of an electric iron should exercise caution, however, as many irons of this type now on the market only generate suf-

icient heat for the lightest soldering operations. Lack of capacity in the iron will be disastrous to good soldering and this also applies to the plain copper. "Rosin joints" and insecurely soldered connections are often traced to this source. The only motive in the employment of a soldering iron is to convey heat to the parts to be soldered, and not until these reach a solder-melting temperature can they be successfully soldered. A good standard iron of the electrical type is shown in the photo at the upper left (on this page). Long and slender points on the soldering tool have a great appeal to the uninitiated, as having a very efficient appearance, but the use of such points will likely lead to trouble. When using such a point conduction and radiation in the parts to be soldered may be so rapid that heat cannot be delivered speedily enough through the slender point to keep the parts at the proper temperature.

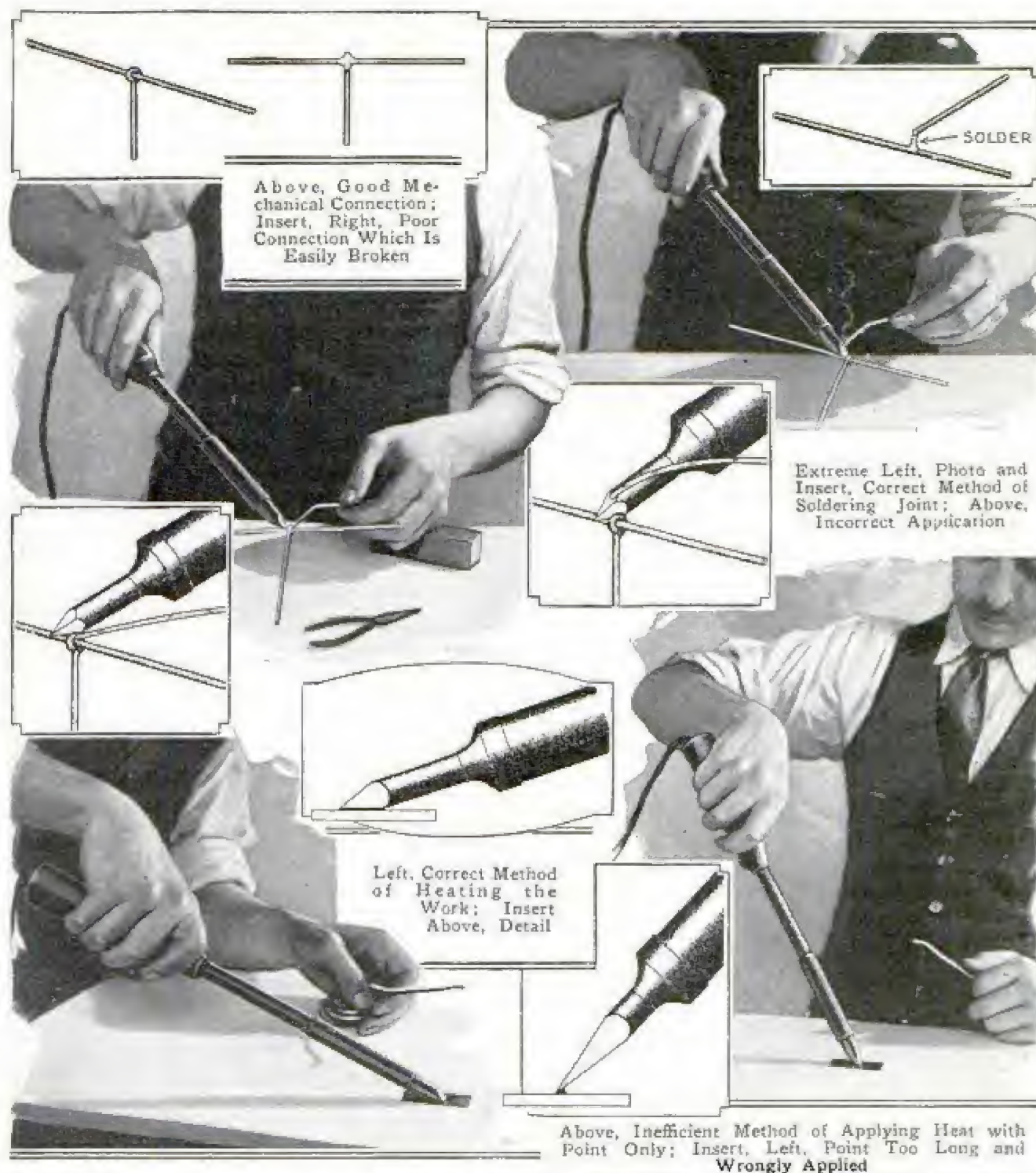
Before any effort is made to use the iron

we must coat the working faces with solder. This process is commonly called tinning, and affords a means of utilizing the force of capillary adhesion, which is of material assistance in heat conduction. This tinning of the iron retards the formation of oxides on its working faces, and, as oxides are poor conductors, the value of this coating is apparent. To secure this surface on the iron we first heat it, and, after filing away all oxides, take a piece of bright tin and with the clean and heated iron melt some rosin-core solder on its surface, moving the iron back and forth in the molten pool of solder and rosin, as shown in the photo on page 473, until the working faces present a uniformly coated appearance. Frequent reapplications of the iron to this tin sheet will assist in the preservation of the coating. Overheating the iron will tend to destroy the surface, and the iron should immediately be tinned again, if best results are to be expected in continuous use.

Poor handling of the iron, even though it be of sufficient capacity, properly shaped, well tinned and correctly heated, may be the cause of solder failures. Obviously we must have the work suitably prepared to receive the solder and apply the iron intelligently. At the upper left, on page 475, two wires are shown properly connected preparatory to soldering; where stresses are likely to occur, it is highly important that a good mechanical connection be made to insure a good electrical contact of the surfaces before applying the solder. It is obvious that such surfaces must be clean and bright. In the past, and unfortunately still in the present, many amateurs and some manufacturers persisted in butting wires together and depending on the solder alone to hold the connection in place; such an error is shown in the inset at the upper right. The connection will not only break, but the result will be a high-resistance joint that invariably will produce poor results even if it holds. The correct method of soldering a good mechanically formed connection is shown in the photo at left; note that the iron is held on the work in such a manner that both wires are heated, and the rosin-core solder held on the opposite side of the joint until the heated surfaces melt it, flowing the solder in and over the joint; when this occurs,

the iron is immediately removed. The work should either be clamped in position or held immovable with pliers until the solder sets; this condition is evidenced by a quick turn to a light-gray color. Moving the work while the solder is cooling will result in a fractured joint that will give trouble later. Never carry rosin-core solder on the point of the iron, as the active fluxing element of the rosin is driven into the atmosphere in the form of a blue-white smoke at a very rapid rate when subjected to the direct heat of the iron. This is illustrated in the photo at left, where the solder is being applied directly to the hot iron instead of the heated material to be soldered. Close-up insert drawings show the right and wrong methods clearly. When the joint has absorbed sufficient heat to melt the solder the rosin is liberated where required in just the right quantity, thoroughly cleaning the surface and permitting the molten metal and heated surface of the work to form what to all intents and purposes is a welded joint. To heat surfaces to be soldered properly, the working face of the iron must be brought in contact with the work in such a manner that a maximum of surface is presented to hasten the transmission of heat. The lower left-hand photo, page 475, shows the correct method of applying the iron to the work to obtain this result, while the photo at the right shows the tip of the iron applied instead, resulting in poor heat transmission to the surfaces to be soldered.

Insulated wires of the enameled type must be cleaned of all enamel at the point to be soldered, before any attempt is made to connect them. This is best done mechanically, with a knife or sandpaper, rubbing or scraping until the bright copper surface is exposed. Cotton, rubber or shellac-covered conductors must also be mechanically cleaned before soldering, and in the case of some rubber-covered wire it will be found that a sulphate has formed that has practically destroyed the tinning on the strands. It is then best to clean down to the raw copper, as rosin cannot remove this material in the quantities that will be experienced. Exercise care in soldering rubber-insulated hookup wire, as this insulation may melt and run into your joint. Heavily oxidized or dirty metal sur-



faces should be cleaned thoroughly with a file, sandpaper or scraper before attempting to make a soldered connection, and the same thing applies to nicked surfaces. By following these simple instructions pertaining to the use of rosin-core solder, you will eliminate all possibility of rosin joints and be agreeably surprised at the ease with which good joints are made.

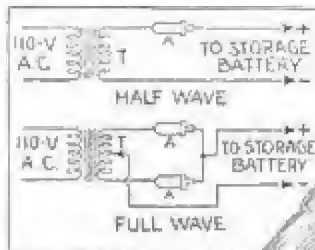
Better-Selectivity Kink

Strong local broadcasting stations and the use of sensitive detector tubes are the

cause of apparent broadness of tuning in the average receiver. This may be remedied in a measure by the use of gridleaks of lower resistance value. If the leak in the set is the usual 2 or 3-meg. type and the detector is of the hypersensitive variety, the result will be a set that is too sensitive for local reception. By substituting a $\frac{1}{2}$ or $\frac{1}{4}$ -meg. leak the set will be found to tune much more sharply. Extra leaks of various values should be kept on hand and used when local stations are inclined to spread out over the dials.

New A-Rectifier in Cartridge Form

With an entirely new principle as a basis, a highly efficient, non-breakable and fool-proof rectifier has been placed on the

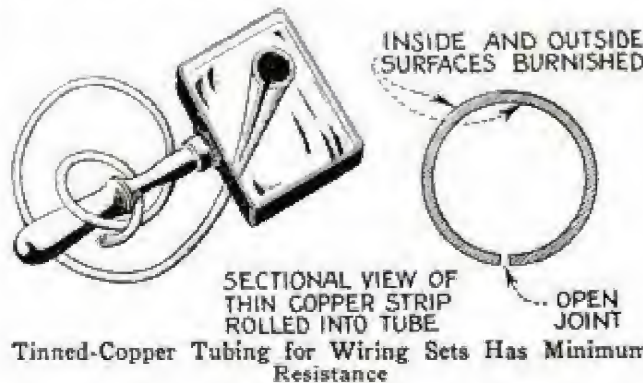


New A-Rectifier Cartridge Which Is Capable of Passing $2\frac{1}{2}$ Amperes at 6 Volts

market. It is designed for use in A-eliminators, but also serves the purpose of charging batteries, being capable of passing $2\frac{1}{2}$ amp. or less of direct current at a potential of 6 volts. It is about the size of a man's thumb and is contained in a strong metal cartridge. It has no delicate filament, chemicals or moving parts to cause trouble, and is merely snapped into a clip holder.

Copper Tubing for Wiring

Minimum r.f. loss is claimed for a tinned-copper tubing made in England for wiring of radio sets, as its conducting surface is much greater than that of ordinary busbar wire. The tubing is rolled from a narrow strip of copper, the two ends meeting in an open joint. Both inside and outside surfaces are burnished, to reduce resistance as much as possible. The tubing is easily bent and manipulated with the fingers, and the ends can be flattened out with a pair of pliers so that it can readily be soldered to a lug, giving



more actual surface contact and making a better joint than ordinary busbar wire.—C. A. Oldroyd, Barrow-in-Furness, Eng.

Battery Chargers

There are three types of battery chargers in common use for recharging radio storage batteries, the mechanical type, bulb type and chemical charger. The choice lies largely with the individual. All have their good points, but under certain conditions one type is better suited than the other. The bulb or "tungar" charger makes use of a glass bulb containing a hot and a cold electrode, and is filled with a gas. In operation, the electric current is conducted in but one direction through the gas between the electrodes. This type of charger is comparatively quiet, and, if placed on a large book or magazine that will take up the slight vibration, cannot be heard a few feet away. There is no chemical to spill and the unit is very compact. The current supplied to the battery is steadier than that supplied by mechanical chargers, and there are no movable parts to wear out. The bulbs last several years if carefully handled, making this type of charger very reliable.

The mechanical type of charger depends for its action on a vibrating switch which alternately connects the battery in one direction, and then in another direction in regard to the source of supply. This switching is done in phase with the fluctuations of the alternating current, so that the current always flows through the battery in one direction. Good mechanical chargers are ruggedly built and give very good service, although they are not so quiet as some of the other types, and sometimes cause interference to other radio listeners in the neighborhood. However, as one usually charges the battery in the daytime, this objection is not a serious one. The contact points wear out after some time's use, but are easily renewed by

Antorveyors, Ltd. 82, Victoria St.
 London, S.W.1, England.
 12 ft. about 60 cent.

867-R

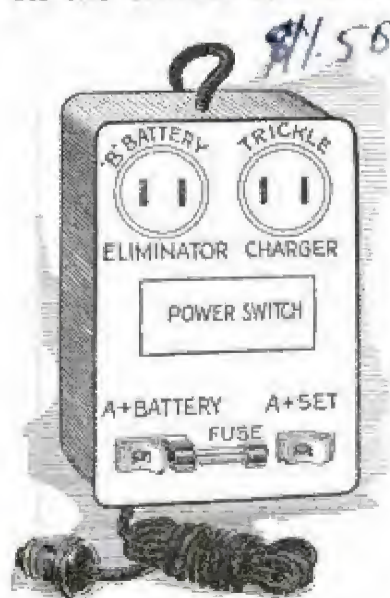
the factory or electrical repair shop. The chemical chargers are simple and require very little attention, but they cannot be carried about like the other types referred to. They are especially suitable where but small current delivery is required, as with sets using the 4-volt storage battery for the 199-tubes, and for sets using not more than six of the 201A-type tubes on a 6-volt storage battery. They are also ideal for recharging storage B-batteries. They depend for their action on a chemical solution and suitable electrodes; when the electrodes are placed in the solution the electrical current is permitted to flow in one direction only, through the solution between the electrodes. The objection to the electrolyte, which is usually of a corrosive nature and if spilled will damage rugs and furniture, is not a serious one, as the same objection applies to all kinds of storage batteries.

Automatic Switch Controls B-Eliminator and Trickle Charger

Radio owners frequently forget to switch off the current to the B-eliminator when

not in use. This is apt to burn out a rectifying tube, if one is used, or a condenser. To eliminate this risk, an automatic switch is now available. It is connected in series with the set and the storage battery. When the switch on the set is

snapped on, it automatically turns on the B-eliminator and cuts off the trickle charger, and when the set is turned off, the B-eliminator is disconnected and the trickle charger again connected. As fire underwriters require that all A-battery circuits must be fused, a 10-amp. fuse is provided on the switch to make its use perfectly safe.



Installing Storage Battery in Console

Some consoles have so little space above the battery, which is set in the lower compartment, that it is impossible to take a



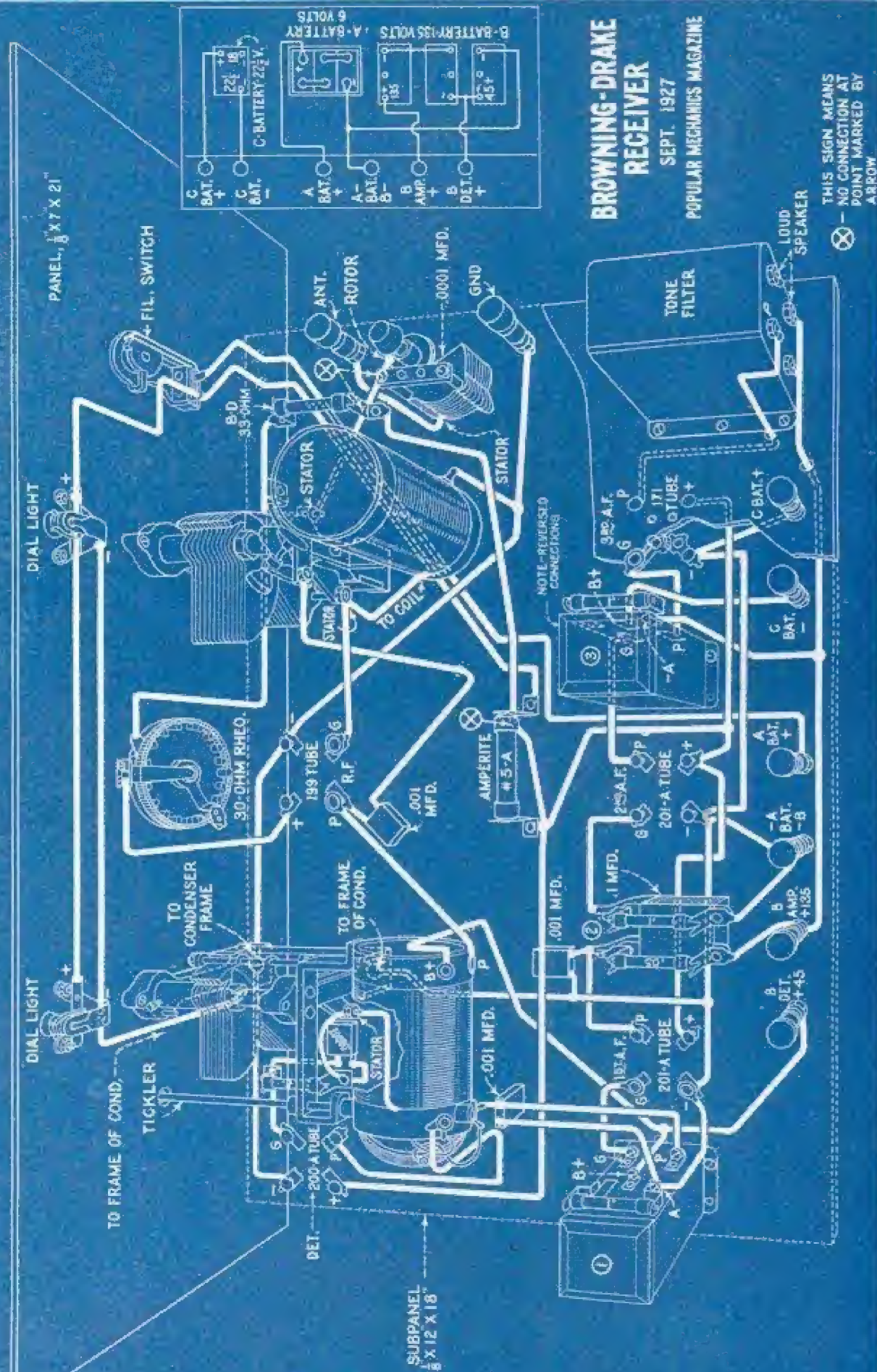
False Bottom in Console Holds Battery, and Slides Out to Facilitate Testing

hydrometer reading, unless the battery is removed, and this is rather inconvenient. However, by providing an outward-sliding false bottom, as shown in the drawing, one can get at the battery without any trouble. Lengths of Z-bar are used for slides, or two wooden strips, as shown in the lower detail. It is a good idea to provide some kind of stop to prevent the board from being pulled out too far, which might upset the storage battery and spill the electrolyte over the floor.—Michael Duzmal, Chicago.

Trouble in B-Battery Leads

A frequent source of trouble lies in improperly placed B-battery leads; never run such leads near the storage A-battery, particularly if they are cotton-insulated. The fine acid spray from the A-battery when being charged will quickly destroy the insulation and any wires in contact will immediately cause a short circuit that will quickly ruin the B-battery. The leads should be of the rubber-covered type and kept well away from the A-battery. Also, keep all B-battery leads as short as possible and in no case longer than 6 ft.

Liberty Bell Mfg Co.



Building Latest Browning-Drake Receiver

by
Glenn H. Browning



THIS latest model of the Browning-Drake receiver is the result of constant work on the set since its introduction to our readers about a year ago. A few improvements have been incorporated, one of which is a balancing system, having the advantage of being more nearly constant over a band of wavelengths from 200 to 500 meters. Control has been simplified, reproduction improved, and last, but decidedly not least, better selectivity has been obtained, making the new model very attractive. It incorporates a low-frequency amplifier with excellent tone quality and the circuit is built around an efficient tuned high-frequency transformer developed at Harvard university by the author and his associates.

One stage of tuned high-frequency amplification is used in conjunction with a regenerative detector unit. The condensers and coils have been improved from both an electrical and mechanical standpoint, and the construction details worked out in a very simple and practical manner. The combination low-

frequency amplifier consists of one stage of impedance-coupled amplification, one stage of resistance-coupled amplification and a final stage of resistance-coupled amplification with an impedance leak, a combination finally selected

after many experiments. This type of audio amplifier not only preserves all the qualities of resistance and impedance amplification, but it seems to be more stable in its operation with B-eliminators and is therefore better suited for a.c. operation. The parts have been laid out in such a manner that interaction troubles have been reduced to a minimum, and the builder is advised to follow the blueprint diagram closely so as to obtain best possible results. It will be noted that ample space has been left between the two tuning units for the high-frequency amplifier tube, permitting short connections to be used for the high-frequency circuits. The detector is placed at right of the 2d tuning condenser; the r.f. transformer and the audio-frequency amplifier are in the rear. Care

has been taken in the layout not to place any of the apparatus too close to the coils, as this tends to increase their resistance and makes the tuning less sharp, and the builder must remember this. Two



Completed Set in Cabinet Showing Tuning Controls

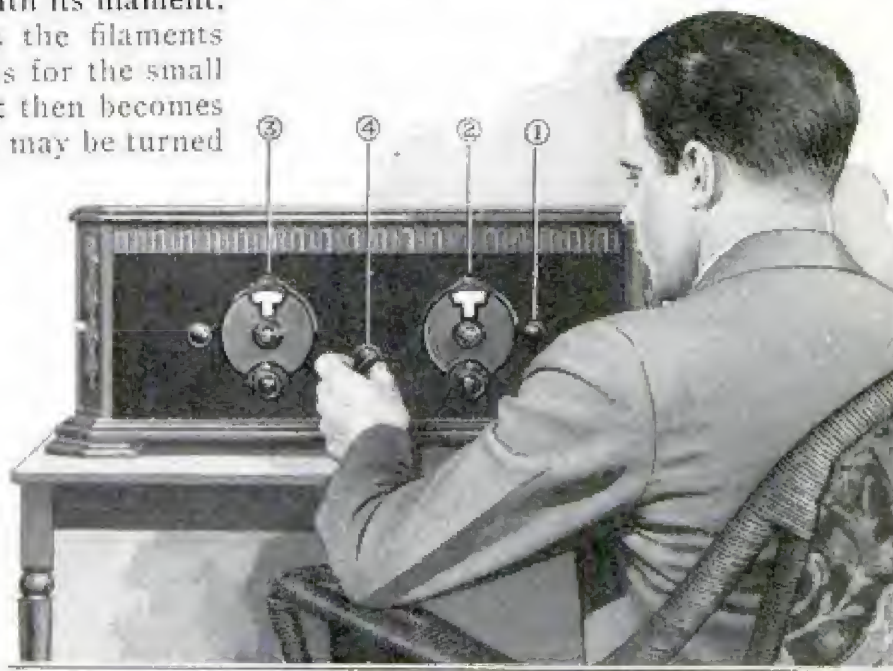
tuning dials, a filament switch, a 30-ohm rheostat knob for controlling volume and the knob which rotates the tickler coil, are the only controls on the front panel. No jack has been provided for phones, but

soldering, to insure good connections between the condensers and coils, which is most important. The receiver is primarily intended for operation with large tubes, except in the r.f. stage, where a CX-299 or UX-199 tube should be used. The resistance of 33 ohms in series with its filament, reduces the 5 volts across the filaments of the other tubes to 3 volts for the small tube. The 30-ohm rheostat then becomes solely a volume control and may be turned completely on when full volume is required. For detector, use either a CX-300A, or UX-200A tube, as the author has found it to be more sensitive on weak signals than a 201A type. The grid return on this tube is run to the negative side of the filament, as shown in the diagrams. For the first two stages of the audio amplifier, use either "High Mu" or 201A tubes, or one of each, as desired. In the last stage of the amplifier it is essential to have some type of semi-power tube, such as the 171 type, for best undistorted volume.

The output unit consists of an audio choke, combined with a 4-mfd. condenser, keeping the direct current flowing in the plate circuit of this tube from passing through the windings of the loud speaker. This is optional but is very desirable in most cases as it improves the tone quality slightly and at the same time protects the speaker. This output unit is shown connected in the circuit in the full-page diagram, but not in the schematic drawing.

When the set has been constructed according to the diagrams, it is ready to be balanced. Connect the batteries, as shown in the sketch at the right of the large detailed diagram, turn on the switch and try one tube in the sockets successively, to be sure the filament circuit is as it should be; if the tube lights, put all tubes in, and connect the set to aerial and ground. If the set is performing as it should, turning the rotor coil to a certain position should give a slight "plop," and upon touching the finger to the grid side of the r.f. transformer, or the stator plates of the second

tuning condenser, the plop should be repeated; this is the test for oscillation in the secondary of the r.f. transformer. With the tickler coil set in the position just back of the point at which the plop occurs, station whistles should be heard upon rotat-



Adjusting Rheostat to Control Volume; Numbers Above Show Sequence Employed When Tuning

ing the second or right-hand condenser, if a station is operating. The receiver, now operating normally, should next be so balanced that no radiation is sent out and maximum signal strength and selectivity are obtained. Tune in a local station by means of the two dials indicated at 2 and 3 in the photo on this page, and then turn off the rheostat labeled 4. Probably the local station will still be audible, or can be made so by adjusting the tickler coil indicated by 1, or the second tuning condenser. Now set the balancing disk signal shown in the upper photo on page 480 in such a position that a minimum signal is obtained; the receiver is then balanced or neutralized.

In case of several local stations, the one chosen for balancing should be the one operating on the lowest wavelength. Where there are no local stations, the set may be balanced by tuning in the whistle from semidistant stations, then setting the balancing disk so that a change of the dial 3 does not alter the pitch of the whistle. Of course, the intensity or loudness of the whistle will always be affected by the setting of the first condenser at left, so do

not confuse this with the pitch of the whistle. A little experience in tuning on the part of the operator is better than a whole book on the subject although a few suggestions may be useful. Referring to the photo on page 481, you will find the controls numbered in the order in which they are manipulated. First, set the rotor coil 1 on the B-D transformer in such a position that the secondary circuit is oscillating; next rotate the second dial 2 until a whistle is heard; this is the carrier wave of the transmitting station beating with the oscillations the set is producing and will be heard if a station is within range. Turn back rotor coil 1 so that the whistle disappears and, at the same time, turn the left-hand dial 3 until the signals are loudest. Readjust both dials and rotor coil until satisfactory volume is obtained. It will be found that rheostat 4 makes an excellent volume control for tuning it down, regulating the signals received without detuning the set.

This receiver, being more selective than previous Browning-Drake sets, it is necessary to tune the circuits to exact resonance in order to obtain the best quality. Always regulate the volume by the rheostat and tickler coil, never by setting the

dials off resonance. In case the builder is located in a district where there are a number of high-powered local stations, a metal panel and metal cabinet will stop any pick-up from these stations on the coils and wires of the set, so that outside stations may be picked up through the locals; ordinarily this is not necessary. Do not expect distant reception every night. Static and other interference will not permit it on any set, regardless of design. A vertical aerial, 50 to 75 ft. high, is suggested by the author, although the set will work well on a short indoor aerial, 15 or 20 ft. long, in the same room with the receiver. The wire, however, should be placed as high above the set as possible, and should be well insulated. A good ground connection made with an efficient ground clamp on a near-by water pipe is superior to other types of grounds used by the average amateur; radiator grounds are sometimes suitable, especially if the heating system is hot water, although they cannot always be relied upon.

A large blueprint of the detailed wiring diagram may be obtained from Popular Mechanics Radio department, 200 E. Ontario st., Chicago, for 25 cents. Specify blueprint No. 121.

MATERIAL LIST

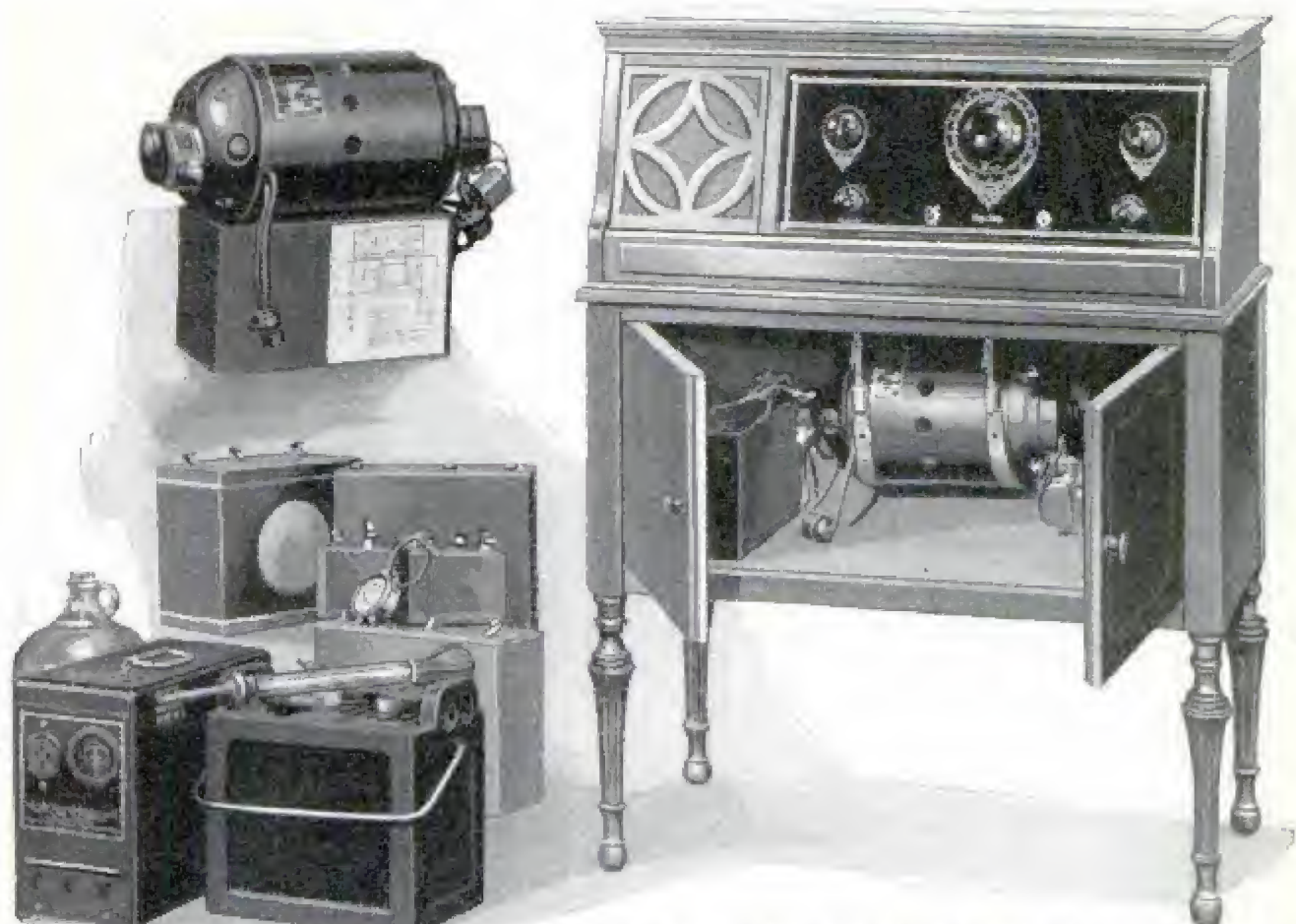
- | | |
|--|---|
| 1 set National tuning units for new B-D receiver, complete with dials. | 1 Yaxley, or similar type, filament switch. |
| 1 foundation unit, consisting of front and base panels, drilled and engraved, with mounted sockets, resistor clips and soldering lugs. | 1 Yaxley, or similar type, 30-ohm rheostat. |
| 1 National Impedafomer, 1st stage. | 8 Eby, or similar type, binding posts with engraved tops. |
| 1 National Impedafomer, 2nd or 3rd stage. | 1 Precise midjet variable condenser, .0001 mfd. |
| 1 Tobe condenser, .1 mfd. | 1 B-D 33-ohm resistance cartridge. |
| 1 Tinytobe fixed condensers, .001 mfd. | 3 resistors, Electrad, Lynch or similar type, one .1 meg., one .05 meg., one 8 meg. |
| 1 Tinytobe, fixed grid condenser, .00007 mfd. | 1 Amperite, type 5-A. |
| 1 National tone filter, optional. | 1 B-D balancing or neutralizing device. |

Overheated Filament Common Trouble

If tube filaments are subjected to continuous overheating, the electron emission will drop to a point where the tube will become inoperative. Most of the tubes now in common use are of the thoriated-tungsten type. This type depends upon a surface layer of thorium oxide for its electronic emission, and this active layer is automatically deposited or formed on the filament when the tube is operated at a certain temperature. Overheating will

quickly destroy the active surface coating and the result is a poor tube. For best results, it is evident that the tube must be kept at the voltage specified by the tube manufacturer. This may be checked with a voltmeter or controlled by the use of any filament-control device.

☛ Interference traced to fan motors may be greatly reduced by placing two 2-mfd. fixed condensers in series across the supply line and grounding the center point between them.



Right, Console-Type Set Showing Motor-Generator and Filter; Lower Left, Equipment Eliminated by Their Use

New Receiver Is Motor-Driven

A complete receiver, which has no batteries or eliminators and employs standard tubes, turns on like a light and gets its power from a silent motor driving a small generator. Its outstanding feature is, of course, its freedom from the inconvenience of run-down or deteriorating batteries and the absence of even such attention as must be given to battery eliminators. The motor-generator receiver illustrated is a single-dial control model with self-contained loud speaker. It cannot be used with batteries, but will operate wherever electric current is available in 25 or 60 cycles, or on direct current. The motor-generator and filter require no servicing and may be installed in the basement, or in any out-of-the-way place, such as a store-room or closet.

Cleaning Bakelite Panels

Panels will gather dust and fingerprints easily, and rubbing with a damp rag will not greatly improve the matter. However, a little alcohol on a piece of cheesecloth,

that has been wrung out in warm water, will clean the panel thoroughly. Wring the cloth out dry and then add a few drops of alcohol, being careful not to get the alcohol on the woodwork. Wipe the panel dry with a soft cloth or chamois skin.

New Unit Recharges Dry B-Batteries

A new charging unit of the trickle type employing the recently introduced metallic element in which the atoms have been re-arranged so that it passes current in only one direction, makes possible the recharging of dry B-batteries of any standard voltage. The batteries are left connected in series and the charging unit is merely connected across them from the negative post of the first battery to the positive post



of the last. The dimensions of the unit are $3\frac{1}{8}$ in. wide by $5\frac{1}{4}$ in. long and 6 in. high.

Kodak Radio Corp.
512 E. 4th St. East

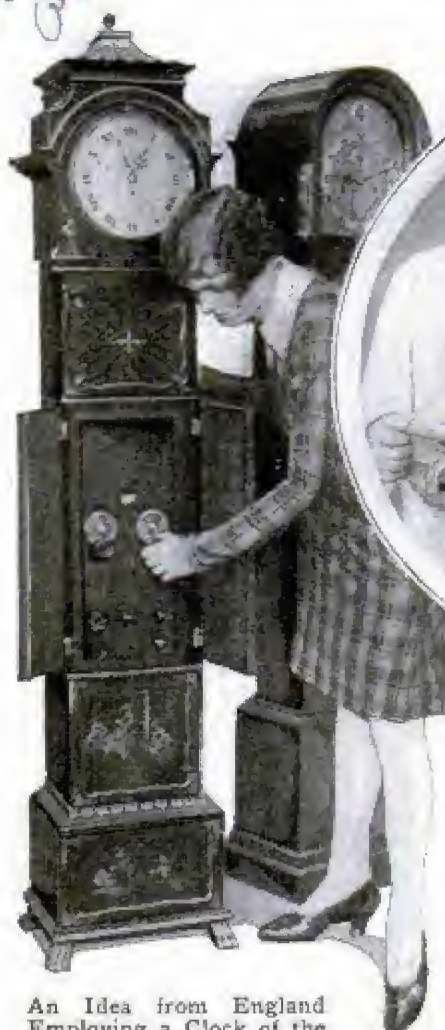
Cincinnati, Ohio.

1357 R

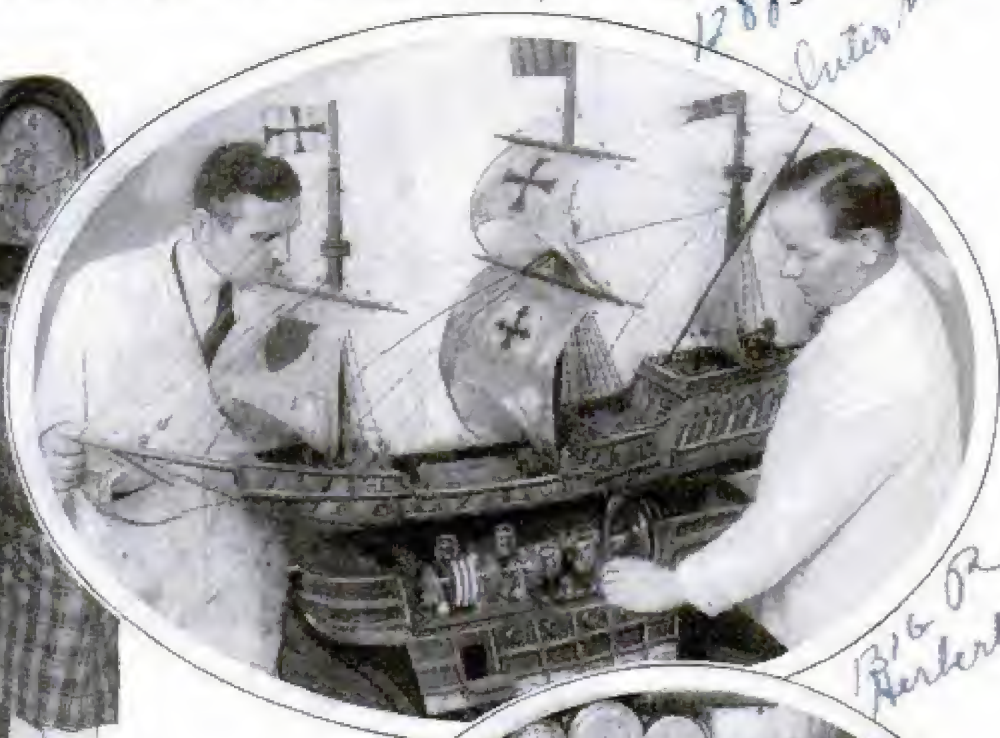
Facts and Fads for Radio Fans

1245-0
1245-0

1288-0
1288-0
Antenna



An Idea from England
Employing a Clock of the
Grandfather Type



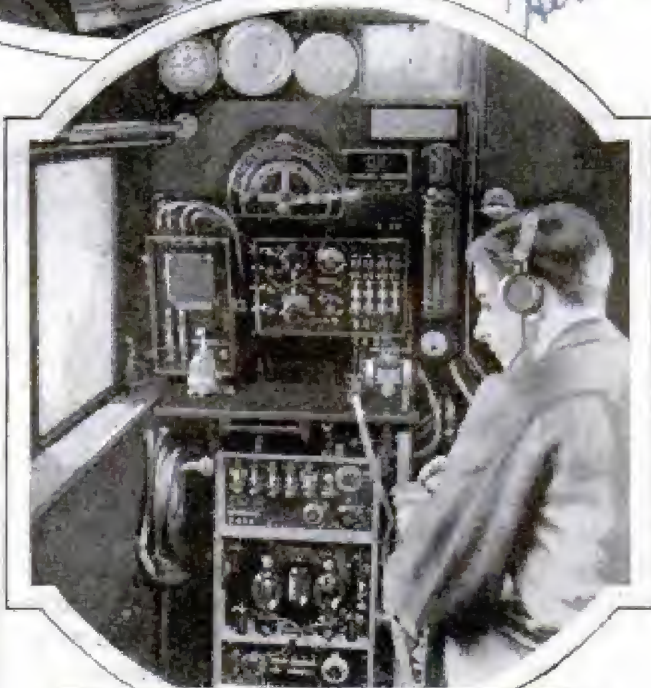
Above, Complete
Five-Tube Re-
ceiver Built into
Ship Model, a
Novel Combina-
tion of the Past
and Present

1316-0
Berkeley

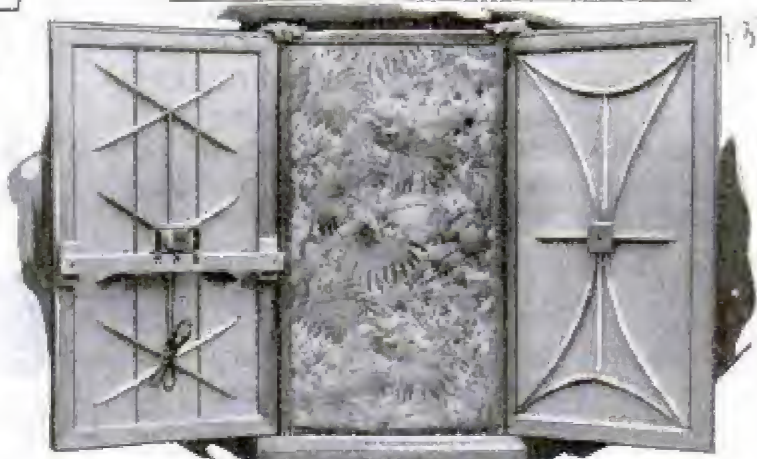


1317-0
Berkeley

Left, Miss Harriette Quick, Brooklyn, Who
Designs and Builds Her Own Sets; Right,
New Loud Speaker Employs Diaphragm of
Central American Balsa Wood, Seven Times
Lighter Than Cork and Which Has Remark-
able Reproducing Qualities



Wireless Cabin in Plane Operating be-
tween England, Egypt and India; the
Winch Serves to Raise and Lower the
Aerial beneath the Plane



1318-0

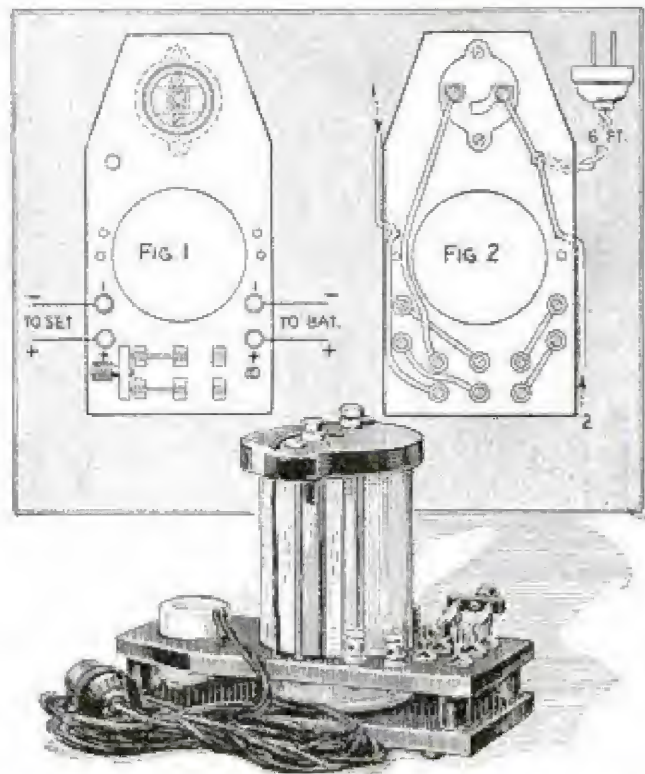
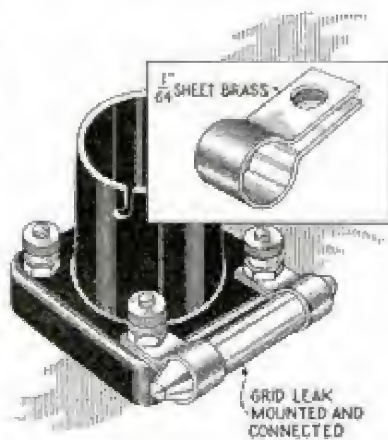
non

Testing B-Batteries

Poor reception is often due to run-down B-batteries, and quite often the owner will attribute the trouble to the set without giving a thought to the B-battery. The A-battery is, of course, watched more carefully, owing to the need of frequent charging. Another reason for neglecting to test the B-battery is the common use of trickle chargers for the A-battery, resulting in less attention being given to the battery compartment. It is a good plan to test the B-batteries about once a month. Provide a small voltmeter of the pocket type, reading from 0 to 50 volts for this purpose. Test each 45-volt unit separately, and when the voltage has dropped to 35 volts or less, discard the battery for a new one. It is not recommended to mix new and old batteries, as new ones soon fall to the level of the old cells. Have them all new to begin with. The large heavy-duty units now on the market are cheapest in the long run and do not change in voltage perceptibly except over fairly long periods of time. As the batteries grow older, place the one having the highest voltage reading at the negative end of the series to compensate for the extra drain of the detector-plate voltage.

Compact Gridleak Mounting

It is usually an advantage, when building radio receivers, to have the parts mounted as compactly as possible without longer leads than necessary, especially in the grid and plate circuits. A grid-leak may be mounted in this manner, as shown in the illustration. Take two strips of $\frac{1}{64}$ -in. sheet brass and make two brackets as indicated in the detail. A hole is drilled so that they can be slipped over the terminals on the tube socket, and after the gridleak is inserted, the nuts are turned down tight, holding the assembly securely.



Trickle Charger Sold in Kit Form Can Be Assembled by Any Radio Fan

Trickle Charger Assembled at Home

The trickle charger shown in the drawing can be assembled by anyone, and the parts are sold in kits with complete instructions for assembling. The total cost of the outfit is only a few dollars, and it has an adjustable charging rate from $\frac{1}{4}$ to $\frac{1}{2}$ amp., depending on the size lamp used in the socket. Besides, it has a d.p.d.t. knife switch, which, when thrown over on one side, connects the charger to the battery, and, when thrown to the other side disconnects the charger from the battery and connects the latter to the receiver. Fig. 1 shows the arrangement of the parts on the base and Fig. 2 the wiring diagram.

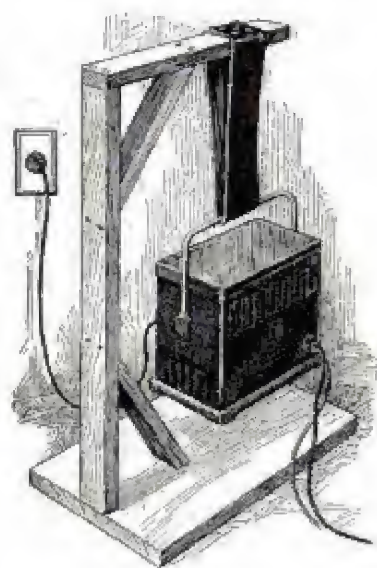
Adapting Three-Tube Loop Set to Aerial

Readers of Popular Mechanics magazine who built the three-tube loop set described in the December, 1926, issue, can extend the range of the set by using the antenna adapter described on page 306 of the February, 1927, issue. This coupler consists of a plug-in coil mounted in a universal socket, and is connected to an aerial and ground. It gives the set wider range but tuning is also broadened; therefore it is advisable to have temporary connections so that the loop can be used on strong local stations in crowded localities.

1342-52.
Radio Sales
2424 Lincoln Ave. Chicago

Eliminating Charger Hum

Some chargers have a tendency to hum considerably, especially when set on the



floor, table or similar surface, which acts as a resonator. Most of this hum can readily be eliminated by suspending the charger on a length of inner tube, as shown. It is passed under the handle of the charger, the ends are

fastened together, and it is then slipped over a specially made wooden frame.

Locating B-Eliminator Troubles

The search for trouble in a B-eliminator should be a systematic process of elimination; the first step is to make sure that the 110-volt current is turned on. This may seem to be a needless caution, but is given for the same reason that the auto owner should look after his gas supply before examining the engine when the car stops. The next step is to make sure the trouble is in the B-eliminator and not in the receiver. A common trouble in the former is the absence of voltage at a given tap, and can usually be traced to an open-circuited or burnt-out resistor. For example, if the fixed resistor is open, the detector-plate voltage will be increased to a point where the signal strength will be appreciably diminished, or constant uncontrollable oscillation will be present. Trouble of this nature may be located by testing each tap with a special high-resistance voltmeter designed for use with B-eliminators. The reading should be about that for which the post is labeled. In case a voltmeter of the required type is not available, a 15-watt, 220-volt lamp may be used for the test. It should glow a dull red on the full output and on the intermediate tap of the eliminator. If the detector tap

shows a glow of the same brilliancy, it is an indication that the fixed resistor, or other type of resistor used, is open. In this case, not knowing the value of the resistance, it is advisable to get in touch with the manufacturer. However, a temporary repair may be made with a Clarostat connected between the amplifier binding post and the dead tap. The Clarostat is then adjusted until the correct voltage is obtained. If all voltage taps are found faultless and the set still fails to function as it should, the trouble may be located in a defective by-pass condenser. A short-circuited by-pass condenser will act in the same manner as a short-circuited resistor. A short-circuited condenser may be located by testing the condenser terminals with a pair of headphones in series with one or two dry cells or a small B-battery unit. A loud click should be heard at the contact, and a weaker click at each successive tapping of the terminals, but if the clicks are equally loud, a defective condenser is clearly indicated. Check all the wiring for broken connections, and use the phone-and-battery test on the choke coils and transformer secondary to be sure there is no opening in any of these windings. The presence of a click upon completing the circuit in any of these coils indicates an uninterrupted path, and the lack of a click a defective unit. If, after these checks, the trouble has not been located, the fault may lie in a defective rectifier tube; the best and quickest method of determining the trouble here would, of course, be to try out a new tube.

Radio Switching Plug

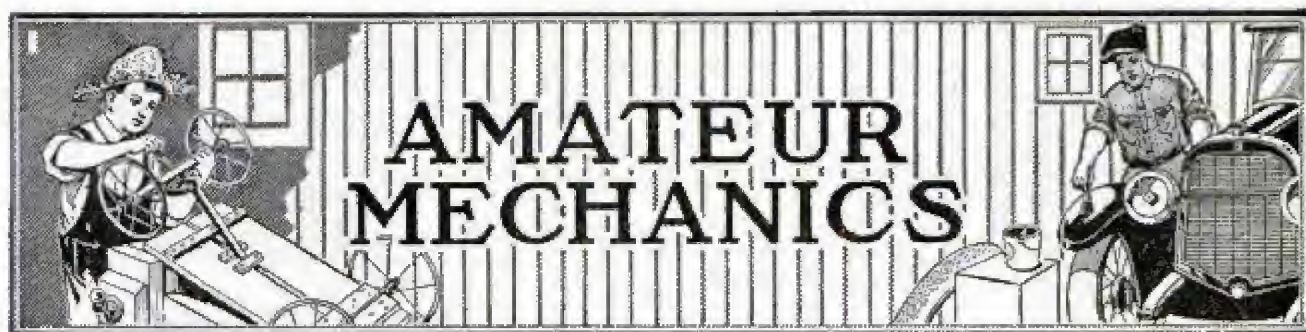
Designed for the tandem use of horn and cone speakers, a recently marketed switching plug is inserted into the speaker jack



as shown in the photo, permitting two speakers to be connected in parallel or in series, the use of horn or cone alone, or shutting both off. There are six positions,

two for parallel connections, and one for each of the others.

maker unknown.



Rabbit Bookcase for Children's Room

By HERBERT C. McKAY

B.P. 612

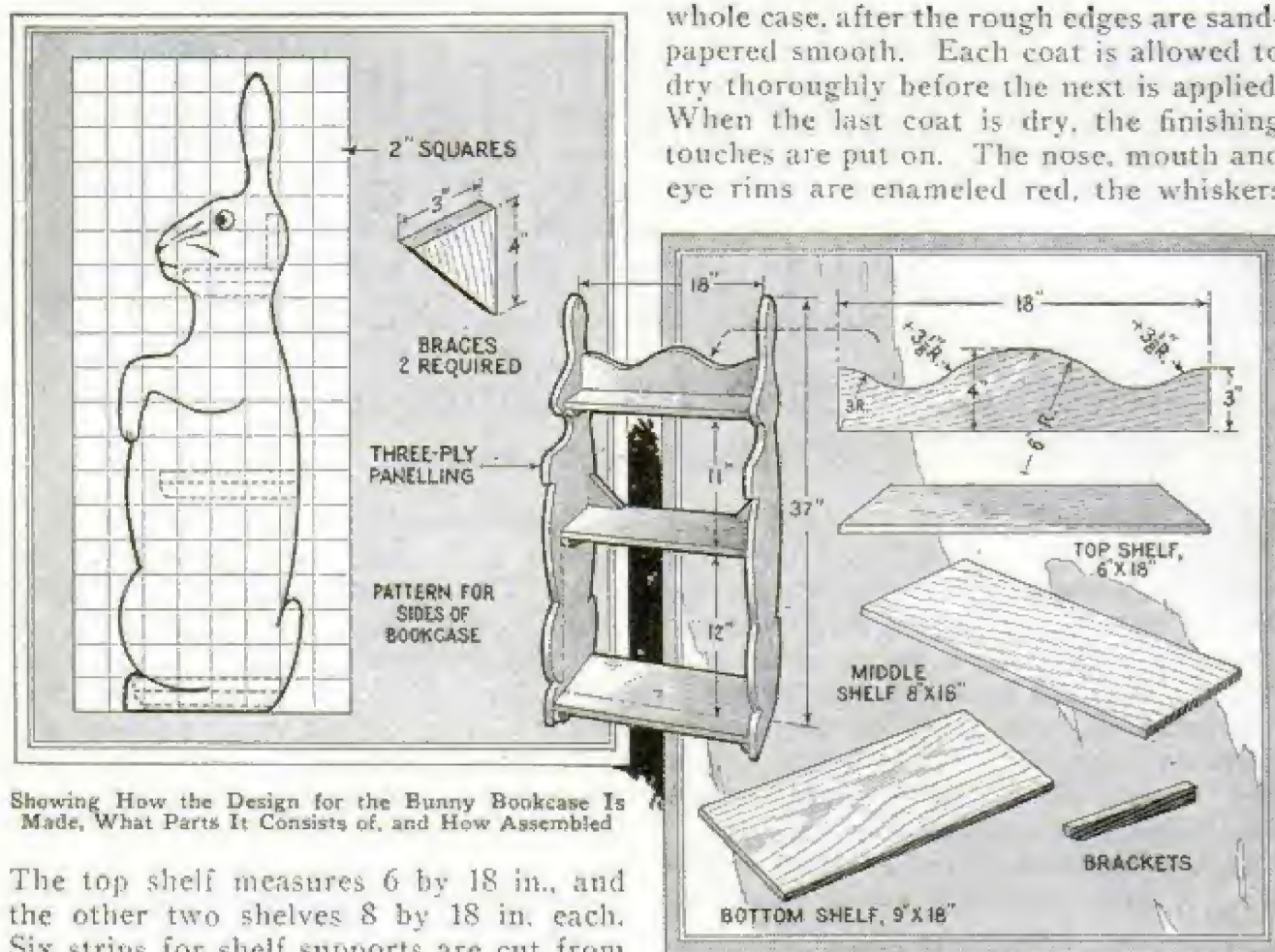
WHEN juvenile books are kept in the family bookcase children do not feel free to take them out when they want to, for the adult members of the family usually object to having their books disturbed. For this reason a bookcase will be found a pleasing addition to the nursery. The books are kept with the other toys, are always accessible for bedtime stories and the child can take them out at any time.

Such a bookcase should be of an appropriate design. The bunny case shown in

the illustration has been found very satisfactory both in shape and appeal to the child. The stock used for making it is the home workers' favorite—three-ply paneling. Two sides are cut out with a scroll or jigsaw, as shown in the layout, the squares being 2 by 2 in. The sides are slightly over 3 ft. high. In addition to the sides, one stop brace or back piece is required for the top shelf. This part is cut from a piece of the same material, 4 by 18 in. in dimensions. The curve can be laid out with a pair of dividers, as indicated, the central curve having a radius of 6 in. and the end curves a 3-in. radius, using the bottom corners of the piece as centers. These curves are connected with two reverse curves of $3\frac{1}{8}$ -in. radius, as shown.



Attractive Children's Bookcase Having Sides to Resemble a Large Bunny Sitting on Its Haunches, Makes Appropriate Addition to Any Nursery



Showing How the Design for the Bunny Bookcase Is Made, What Parts It Consists of, and How Assembled

The top shelf measures 6 by 18 in., and the other two shelves 8 by 18 in. each. Six strips for shelf supports are cut from paneling; these are 1 in. wide and 1 in. shorter than the width of the shelves. The front ends of these strips are rounded off. Finally, two triangular braces are cut from a piece of the same material, 4 by 4 in. in dimensions. The shelf cleats are screwed to the sides; the lower edge of the first one is $1\frac{1}{2}$ in., the second one $13\frac{7}{8}$ in., and the third one $25\frac{1}{4}$ in. from the bottom. The clearance of 12 in. between the two lower shelves provides ample space for large folio-type books. After all the cleats have been screwed in place, the shelves are laid on them and screwed to the cleats and then the sides are screwed to the shelves. It is a good idea to drill holes for the screws before driving them in, the holes being just a little smaller than the thickness of the screw shank. This prevents splitting the wood. The stop brace is put in place at the back of the top shelf, screws being driven into it through the sides and into the edge of the top shelf. The two corner braces are attached at the ends of the middle shelf as shown in the drawing of the assembled case.

All is now ready for painting. Three coats of ivory enamel are applied to the

whole case, after the rough edges are sand-papered smooth. Each coat is allowed to dry thoroughly before the next is applied. When the last coat is dry, the finishing touches are put on. The nose, mouth and eye rims are enameled red, the whiskers

and pupil are black, while the outlines of the legs are pearl-gray with the edges carefully blended into the ivory of the body. The rest of the eye and the tip of the tail are white, while the claws are black.

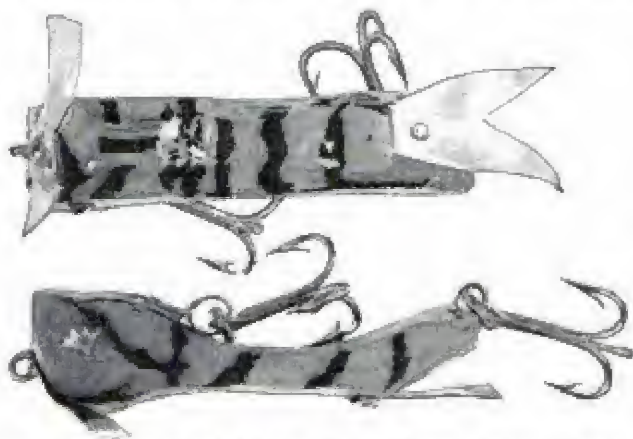
How to Make a Radium Photograph

That radium rays, like X-rays, affect photographic plates, is well known, but it would naturally be supposed that the enormous cost of radium would prevent the making of such a photograph by the amateur. However, a radium photograph can be made at home at practically no cost at all, provided the amateur has patience enough to gather the necessary material, which is nothing else but broken gas mantles. These contain a salt of the rare metal thorium, which is slightly radioactive. Collect a sufficient quantity of broken mantles to cover the bottom of a small cardboard box, a dry-plate box, for instance, with a layer of powdered mantle substance. Upon this layer, and pressed tightly against it, is placed a piece of cardboard; then some metal article to be photographed is laid on

the cardboard box, and covered with sensitized paper. This is again covered with a piece of cardboard and the box is filled with crumpled paper to the top. The cover is then put on, the box is tied up with a piece of string and set in some place where it is sure to be left undisturbed. The radium rays from the powdered mantles penetrate the cardboard and paper, but not the metal article. As the rays are very weak, they must be given four weeks to accomplish their work. After that time, however, a picture of the metal object in white on a dark background will be found on the sensitive paper. Such pictures will not be so sharp as ordinary photographs, because the rays are not focused, but they fairly represent the originals and the experiment is an interesting one.

Effective Fish Lure

A bit of pine wood, a piece of tin and three pins make a good lure for game fish. The photo shows how these floating wood lures are designed, striped with blue-black paint and varnished. The two gangs of treble hooks give it a crawling action, while the hornlike piece on the head is bent to make the bug dip and wobble in the water. The tailpiece is loose and adds to the lifelike appearance by giving the lure a swinging motion. The pins are pushed through, looped and soldered. A pin through the head makes the eyes, a bit of solder being applied at each end. If luminous paint is applied to the under-

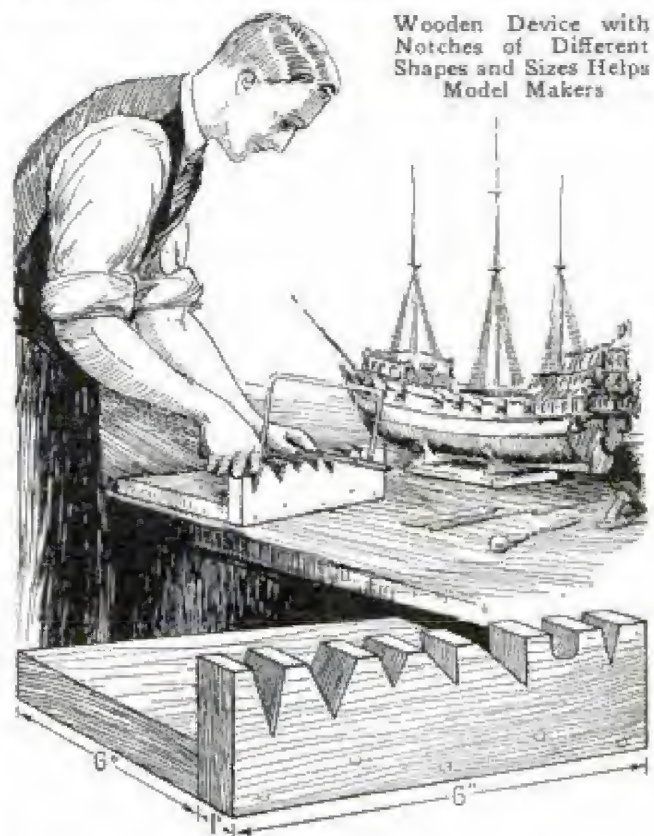


Simple Homemade Lures Which Attract Game Fish side, game fish will strike this bug at night.—L. S. Landmichl, Riverton, Wyo.

¶To empty a large sack filled with heavy material, roll it over a barrel.

Model Makers' Vise

In model shipbuilding, and other similar work, there are many small pieces to be sawed, drilled, etc., that are difficult to



Wooden Device with Notches of Different Shapes and Sizes Helps Model Makers

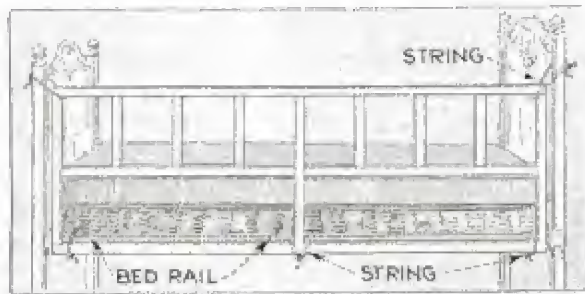
hold solidly. They are apt to be bruised or crushed in a vise and considerable time is lost in operating the vise. With the simple fixture shown in the illustration this trouble can readily be overcome. It consists of two pieces of 1-in. wood, nailed together as indicated, the narrow piece having notches of various shapes and sizes cut along its top to take the different pieces that are to be shaped.

Repair for Cracked Vacuum Bottle

I was going to start the next morning on a 1,000-mile train trip and had to have my quart vacuum bottle for the baby food. Somehow or other it got badly cracked at the last minute, so I thought of mending it with ordinary adhesive tape. I wrapped a 1-in. strip around the bottle twice, then crisscrossed the tape over the cracked spot. There were a dozen or more little cracks besides the big one. I intended to get a new bottle the next day when changing trains, but this was not convenient. The cracked bottle held up well and is still in use.—Mrs. V. S. Martin, Detroit, Mich.

Simple Rail for Child's Bed

Children often fall out of bed while sleeping, bruising themselves and waking the household during the night. One way



Rail Prevents Child from Falling Out While Sleeping

to prevent this is to provide a rail as shown in the drawing, tying this to the bedposts and frame of the bed so that it can readily be removed when not needed.—F. A. Inman, Grand Haven, Mich.

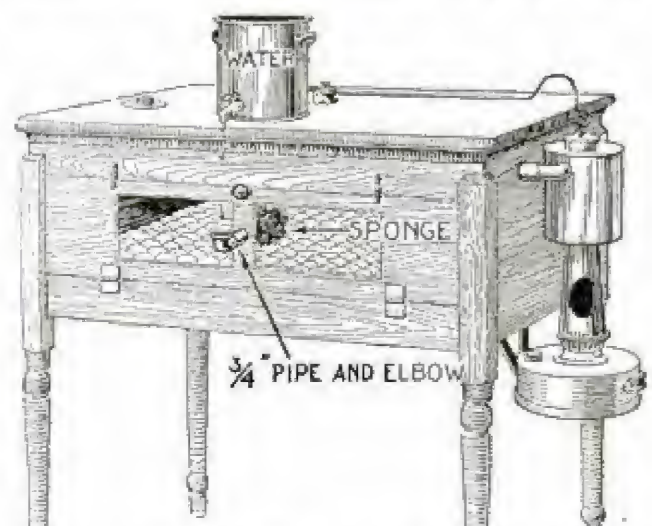
Making a Humidifier for the Incubator

Incubator manufacturers and poultry experts have for many years agreed that a careful regulation of moisture within the incubator is an aid to perfect incubation, and there has been a wide range of opinion concerning the method of applying the moisture for best results. Increasing or decreasing the ventilation has been recommended, but atmospheric conditions are variable, and the amateur therefore has considerable difficulty in adjusting the ventilators correctly. Placing pans of water within the machine has also been tried, but usually this results in an oversupply of moisture and a loss of chicks.

A Wisconsin poultryman who has tried several types of incubators employs a system of his own, which allows him to gov-

ern the moisture within the machine regardless of outside conditions, and he claims that he has been rewarded by more uniform hatches of sturdy and healthy chicks. The ventilation is regulated according to the instructions furnished by the manufacturer, but the moisture problem is solved by the self-feeding device shown in the illustration. In the front of each machine, between the doors, a hole is drilled to admit the insertion of a 12-in. length of $\frac{3}{4}$ -in. gas pipe, with an elbow at the outer end. This is turned so that the open end of the elbow is on the upper side. On top of the machine is a can of water with a faucet, arranged directly over the open elbow. A fine sponge is wired over the end inside of the incubator.

No moisture is applied until the end of the third day after the eggs have been placed in the incubator, and then the faucet of the can is opened so that the water drips very slowly into the elbow. As it passes along the pipe and is distributed over the sponge, it readily evaporates due to the warm air inside of the machine. Every two days a few of the eggs are tested, to determine the exact regulation of the moisture as provided by the faucet. From a standard chart, which shows the approximate size of the air cells in the eggs under natural incubation, it can readily be determined whether the eggs in the machine require more or less moisture. If the air cells of the tested eggs are larger than they should be according to the chart, too little moisture is being provided, and if they are smaller, the moisture supply should be reduced.—G. E. Hendrickson, Argyle, Wis.

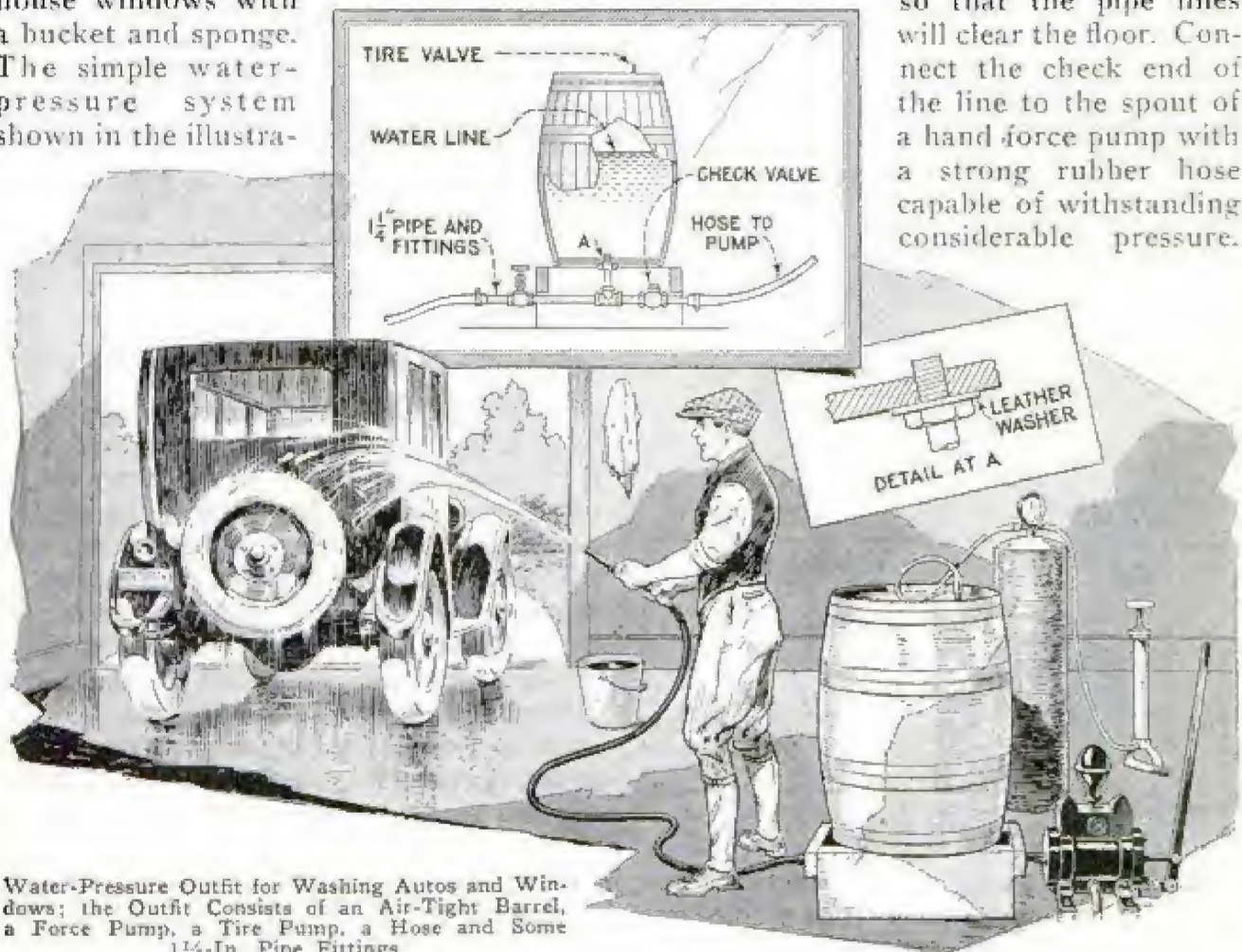


Simple and Effective Method of Getting Correct Humidity Inside of Incubator

Water-Pressure Outfit for Washing Cars

In rural sections where a water supply under pressure is unavailable, it is a long and tiresome task to wash the car or the house windows with a bucket and sponge. The simple water-pressure system shown in the illustration

lead at the joints, as they must be air-tight. Screw an auto-tire valve into the top of the barrel and drive the bung in so that it will not blow out, or else thread in a pipe cap to close the hole. Mount the barrel on skids so that the pipe lines will clear the floor. Connect the check end of the line to the spout of a hand force pump with a strong rubber hose capable of withstanding considerable pressure.



Water-Pressure Outfit for Washing Autos and Windows; the Outfit Consists of an Air-Tight Barrel, a Force Pump, a Tire Pump, a Hose and Some 1 $\frac{1}{4}$ -In. Pipe Fittings

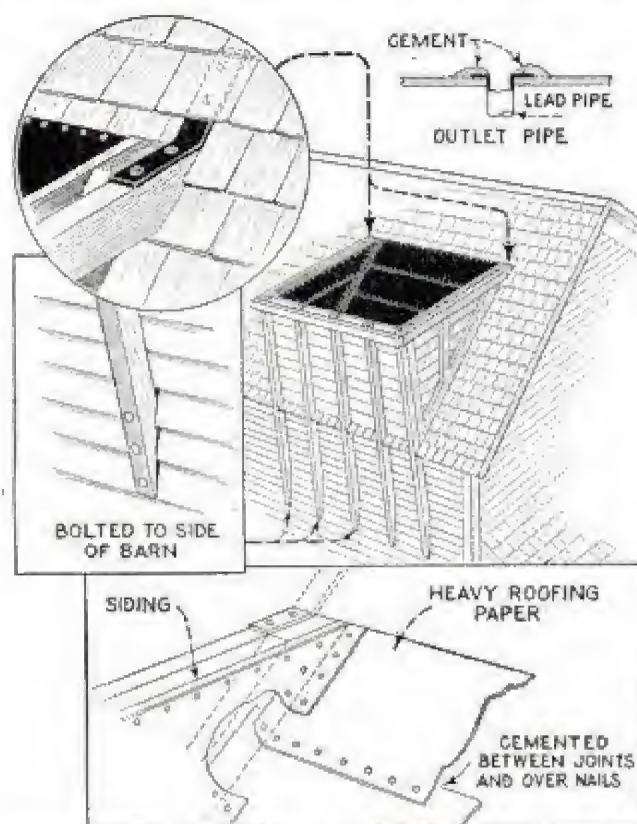
tion is designed to facilitate such work. It can be made from an old air-tight barrel and some pipe fittings. Drill a 1 $\frac{1}{4}$ -in. hole in the center of the bottom of the barrel and thread in a short 1 $\frac{1}{4}$ -in. nipple, placing a leather washer and locknut against the underside and drawing it up tight to make a water-tight joint. The hole should be small enough so that the nipple will have to be threaded in with a wrench. Run a 1 $\frac{1}{4}$ -in. tee on the bottom end of the nipple and thread a short 1 $\frac{1}{4}$ -in. nipple in one end and a piece of 1 $\frac{1}{4}$ -in. pipe in the other end that will just reach out beyond the bottom of the barrel. On the short nipple, provide a check valve and a length of 1 $\frac{1}{4}$ -in. pipe to project just beyond the edge of the barrel, as indicated. On the other end of the pipe connected to the tee, fasten a valve and a short pipe nipple. Be sure to use plenty of white or red

Use hose clamps to prevent it from blowing off at the connections. A length of common garden hose can be attached to the other nipple as indicated. Close the valve and pump water into the barrel until it is about two-thirds full. This should produce considerable pressure, but if not enough, simply pump in air through the tire valve with the automobile pump. If the installation is in a rural garage, the air supply can be obtained directly from the compressed-air tank. When ready to use the water, turn on the valve.—L. B. Robbins, Harwich, Mass.

☛The annoyance of a chair rocking on a bare floor, especially a child's rocking chair, may be overcome by tacking sections of garden hose along the curved rockers. If properly done, this also adds to the comfort of the chair.

Emergency Water Tank Built on Roof

A farmer whose water supply was limited, and who did not care to erect an additional tank, utilized a portion of the barn



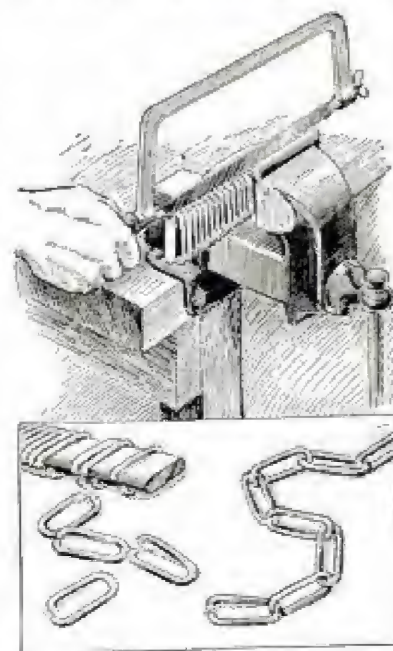
Emergency Water Reservoir for Farmer Having an Inadequate Supply

roof in constructing an emergency tank, as shown in the drawing. The side of the roof facing the direction of the prevailing rainfall was chosen for the purpose. Several lengths of 2 by 4-in. wood were erected vertically, mortised into the eaves of the roof and bolted to the side of the barn below, the ends being beveled to match the angle at which the two met. Then pieces of the same material were laid on the roof, being fastened to it at the top end by means of short pieces of flat iron, as shown in the circular detail, while the lower ends were bolted to the up-rights. A few shingles were removed so that the piece of flat iron could be securely fastened to the roof board, and were then replaced. Pieces of 2 by 4-in. wood were bolted from the top of the up-rights to the upper ends of the pieces attached to the roof. The framework was boarded up from the inside and formed a wedge-shaped wooden tank. The inside was lined with three-ply roofing paper, laid with wide laps, the nails being driven fairly close to-

gether. Roofing cement was spread plentifully between and over the laps and also over the nail heads. A round opening was cut through the tank close to one of the bottom corners for a length of lead pipe, which was held in place by means of a flange on the inside, formed by tapping the edge of the pipe outward with a hammer. The flange thus formed was connected to suitable piping which led to the necessary points. Rains were the sole source of supply for this tank, but it proved its worth and has been kept permanently in position on the barn roof.

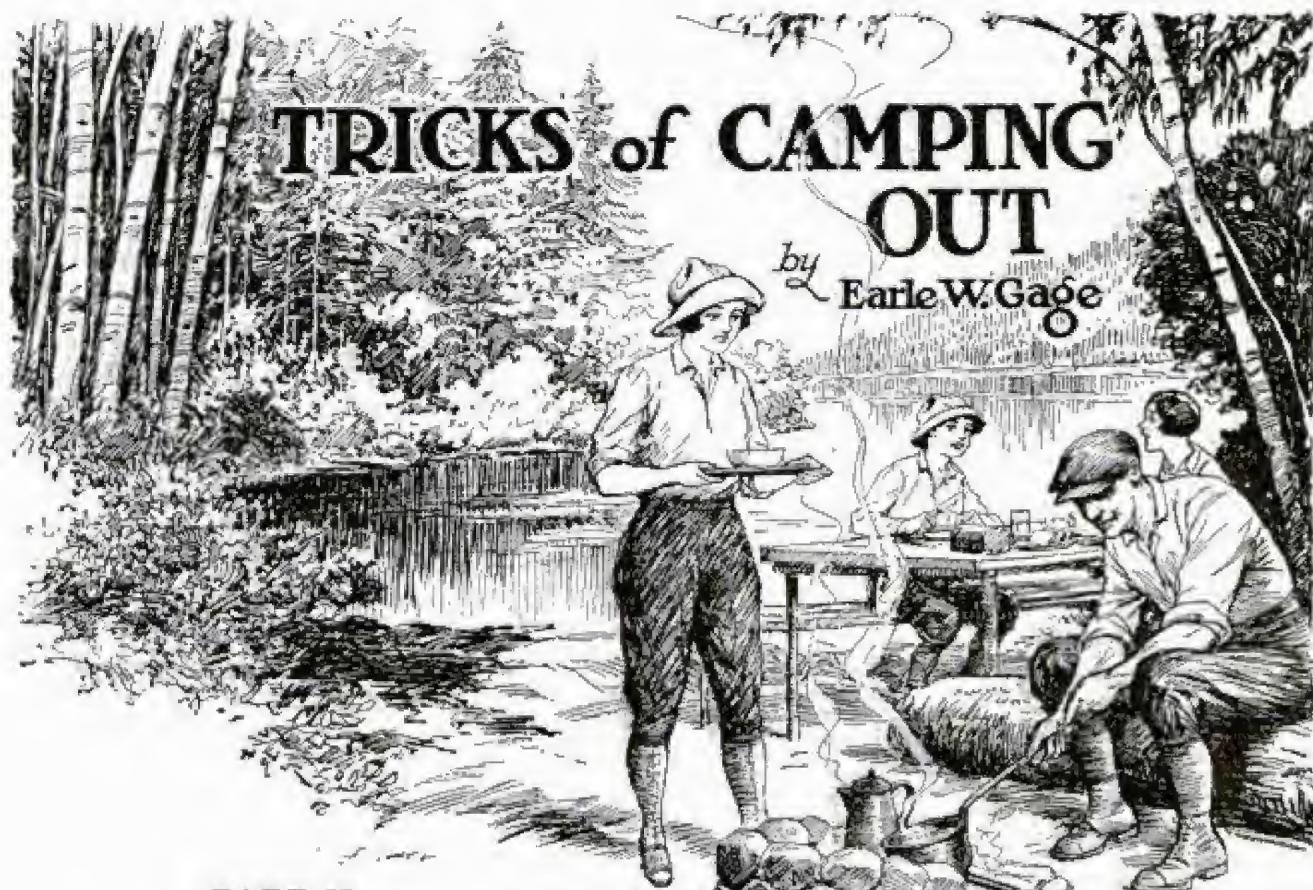
Making Copper or Brass Fixture Chain

Most electric-lighting fixtures are fitted with a brass-plated iron chain, and this is rather unsatisfactory as the brass wears off, thus spoiling the appearance of the entire fixture. The writer overcame this trouble by making a chain of either solid brass or copper wire. Get a piece of flat iron, about 12 or 18 in. long and large enough to form the inside of the links. Round the edges off with a file so that the cross section of the bar forms an oval equal to the inside dimensions of the links. Purchase a small quantity of brass or copper wire the same size as the wire of the chain to be replaced. Clamp the bar in a vise, inserting one end of the wire between the bar and the vise jaw. Then coil the wire around the bar as shown in the drawing, tapping it down with a lead hammer and driving it tight against the bar. When the wire is all wound up in this way, take a cold chisel or a hacksaw and cut the wire along the upper edge as indicated. Remove the links thus formed, file the ends smooth and force them together.—Dick Hutchinson, Ithaca, N. Y.



TRICKS of CAMPING OUT

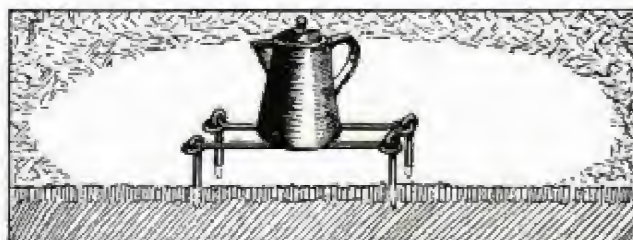
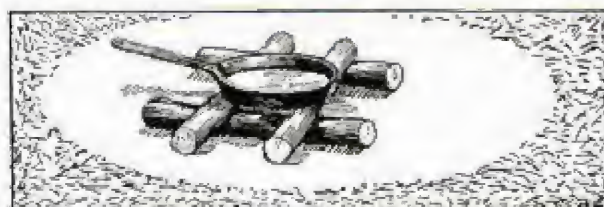
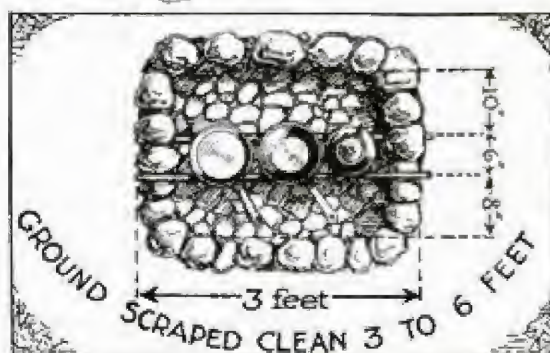
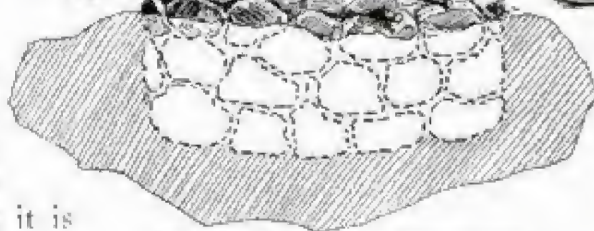
by Earle W. Gage

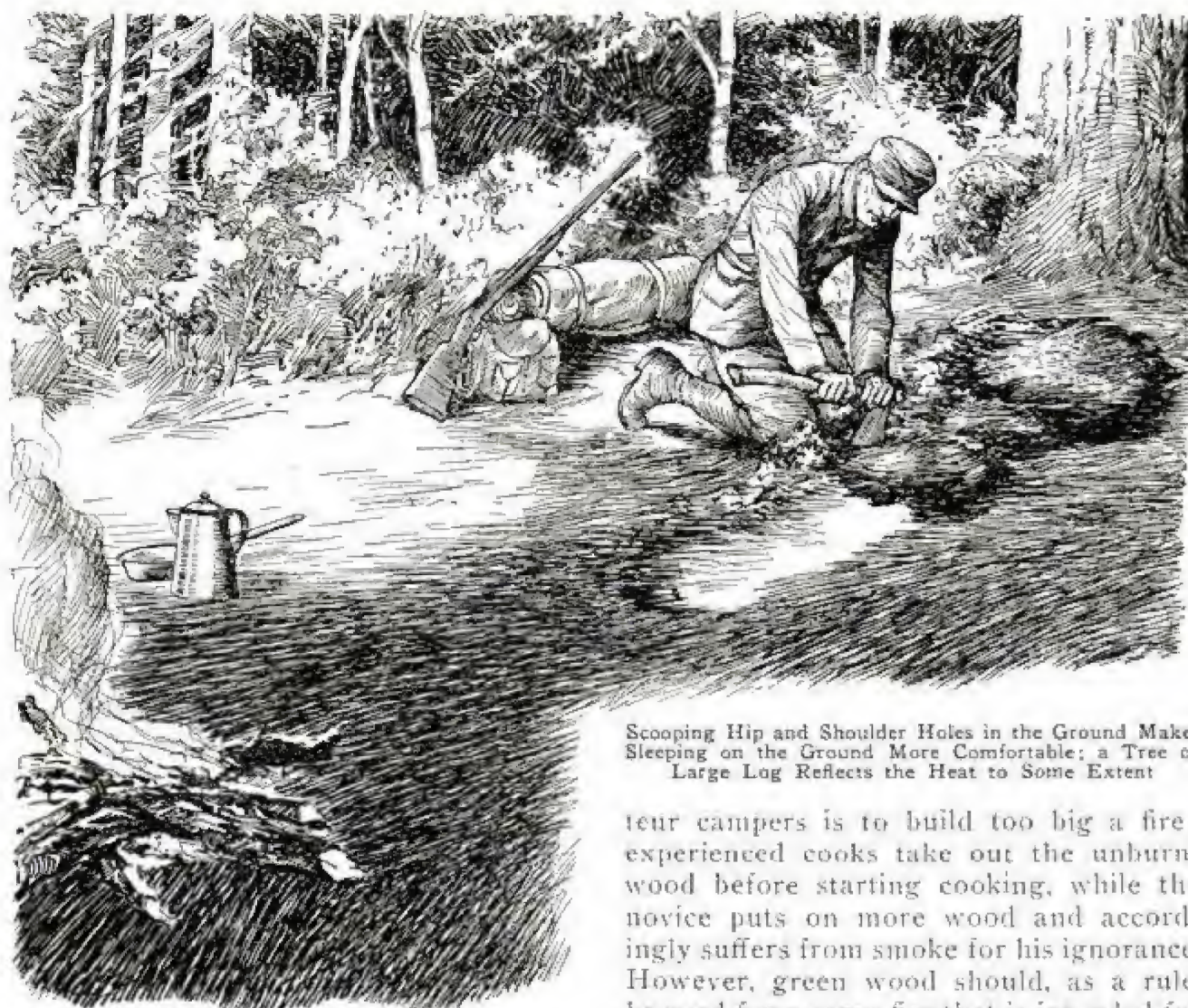


PART II

THE camp fire plays one of the biggest parts in the outing, as all the cooking and baking depend on it. It is best to take a camp stove whenever one can be transported, as it is safer to use than open fires, more convenient, requires less fuel, and does not blacken the cooking utensils so much. Collapsible sheet-iron stoves will be found useful for this purpose.

In the absence of a stove, however, an open hearth may be built. A safe and serviceable fireplace can be made of rocks placed in a small circle and a few iron rods to support the utensils, according to the accompanying illustrations. Where rocks are not obtainable, poles may be used. For permanent camps, it pays to build a stone fireplace over which is laid a piece of sheet iron; this will prevent the blackening of the pans and also give a better draft. For temporary camps, the fire should be built as follows: Excavate a hole, about 1 ft. deep and about 3 or 4 ft. in diameter. Shovel away the side toward the wind and lay green poles across the hole to support the pans and other utensils. Fire irons are often convenient. A 4-ft. length of $\frac{3}{8}$ -in. iron rod is bent at





Scooping Hip and Shoulder Holes in the Ground Makes Sleeping on the Ground More Comfortable; a Tree or Large Log Reflects the Heat to Some Extent

right angles, about 1 ft. from each end, and the ends are sharpened. Two of these irons, placed side by side, with the ends driven into the ground, and the fire kindled beneath them, make a good fireplace. Instead of being made of one piece, the pegs and crossbars may be connected by rings at the ends. These can then be folded and will be easier to pack. Another good way to prepare the camp fire is to select two short medium-thick green logs and level down one side with an ax. Set and brace these logs a few inches apart, so that they will form a support on which the bottom of the cooking utensils will rest safely. Scrape a little trench underneath and, with a few additional logs, form the wind guard on one side. The two logs which are to form the sides of this improved cooking range should be arranged so that they are about 6 in. apart at one end and about 2 ft. apart at the other end, at which the baker may be placed, facing the glowing coals. The common error of ama-

teur campers is to build too big a fire: experienced cooks take out the unburnt wood before starting cooking, while the novice puts on more wood and accordingly suffers from smoke for his ignorance. However, green wood should, as a rule, be used for a camp fire that is intended for all-night service.

The Indians made camp fires long before matches were invented and therefore campers who are caught without matches can make use of the same primitive methods, of which a number are shown in the drawing on page 496. One of these uses a bow of stout oak or hickory, about 2 ft. long and strung with a loose leather thong. Make a drill of balsam, cottonwood, cedar or basswood, and of the same wood make a firestick, split flat with an ax. Notch this firestick with a penknife and start a small drill cup at the point of the notch. Make a pressure block for the upper end of the fire drill from a piece of hardwood, and you will have all the tools necessary for making fire.

You must also get some tinder ready, which will ignite easily. The best is birch or cedar bark. String it into fine shreds between two stones. To make a fire, pass the leather thong around the drill once, enough for the bow to run taut on it. Put

the drill point in the small cup-shaped depression at the end of the notch. Draw the bow back and forth steadily, with even strokes, its full length. You will grind out filings which are brown, but after two or three seconds you have a pile of black shredded wood dust, and presently smoke will come from the pile which forms on the top of a chip placed under the notch. A glowing coal will form in this as you blow on it gently; add some of the tinder and capsize the coal into it. Breathe gently on the flame.

Another method is to take a piece of bamboo, split it in half, and, after starting a notch, rub rapidly across with a sliver of bamboo. This forms a pile of dust from which will presently come smoke and a glowing coal, to which tinder is added and the flame started. Still another method is to knock the ball out of your rifle cartridge, take out all the powder, placing some in a pile of tinder, discharge the rifle or receiver into this, using only the primer and a few grains of powder strewn down the barrel. This is the easiest method of making fire in the woods, aside from the

use of matches. If there is sunlight, a magnifying lens or a watch crystal filled with water will serve to concentrate enough of the sun's rays to start a fire. Unless you have tinder, it is impossible to get a fire with flint or steel.

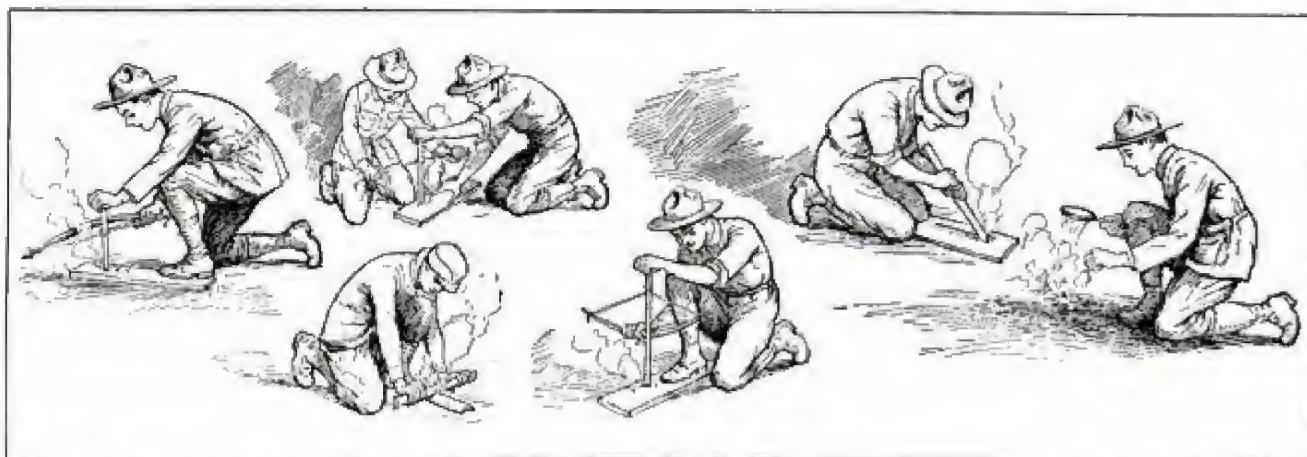
Good bedding is important because nothing takes more from endurance and enjoyment than loss of sleep. Where light weight is the object, nothing surpasses a sleeping bag. The best ones have an outer bag or canvas, tanalite or balloon silk, with two inner bags of eiderdown or other good blanket or quilting. According to the weather, the sleeper has more of the coverings over him to keep warm or beneath him for softness. Any blankets or quilts can be made into sleeping bags by folding them lengthwise and sewing or fastening the edges with horse-blanket safety pins. Of course, these are not water and wind-proof. Without a sleeping bag and without having bedding enough to improvise one, most warmth can be had by lying down and drawing the blankets over you as a coverlet; then lifting the legs without bending at the knees, and tucking the cov-



Proper Method of Tucking a Blanket under One's Legs for the Greatest Comfort When Sleeping in the Open; Always Sleep with Your Feet toward the Camp Fire

ering smoothly under them from both sides, folding the ends under the feet; lifting the hips and tucking the covering under similarly and finally following the same procedure at the shoulders, so that the edges are overlapped for the full length beneath you. Two light blankets are

scoop hip and shoulder holes. If the fire must be kept up all night for warmth or safety, have your head toward a log or tree to reflect the heat and stop the wind, for you should be windward of the fire to avoid smoke and sparks. The fire should be 5 or 6 ft. from your feet and in an open



Various Methods of Making Fire When No Matches Are Available; the Use of a Wooden Drill Rotated by a Bow Has Been Found Especially Satisfactory

warmer than one heavy one. Better than blankets are quilts of eiderdown or wool, with extra covering of denim or more weatherproof material. A 7 by 7-ft. sheet of 10-oz. canvas, folded, makes a good ground cloth and extra cover, while it is also useful as a pack cover when traveling or for a rain shelter.

Folding cots and pneumatic mattresses are practical for auto and pack-horse trips, although too heavy to carry when hiking. Brush beds are easily made from feathery coniferous boughs. Other boughs are useless. Use none that are larger at their butt than your thumb, and these only well covered by smaller tips. Collect a good supply first. If possible, confine the entire bed by 4 or 6-in. logs pegged in place, before the brush laying is begun, and with foot logs resting on the side logs. Lay the largest boughs in courses, "bow" up and overlapping, so that the butts are toward the foot end of the bed and, except at the very foot, covered by tops of other courses. Keep pushing in smaller boughs the same way; always lengthwise of the bed, bowed ends up, and butts down and covered by tops. Finally sift the smaller ones evenly over the whole. Try the bed and build up the weak spots.

If you have to sleep on the ground, choose a level place (so that you won't slide) and one that is free from roots; then

place, where you can walk around it and where no log, tree or rotten wood can catch fire from it. Before dark, drag up a good supply of the biggest logs and chunks you can find. Also locate more so that you can go out in the dark to get it if necessary. Sit up late, burning your smallest stuff. Save the biggest to keep the fire longest without replenishing during the night. Keep your shoes away from the fire even if they are wet.

While permissible on horse and auto trips, tents are inconvenient to carry when hiking. If taken at all, they should be small and of oiled silk. They are unnecessary unless it rains, and then shelter is provided by lighter ponchos, tarpaulins or like covers, elsewhere suggested as part of the bedding equipment and better adapted for this in good weather. They can be stretched, lean-to fashion, facing the fire and with the back to the wind.

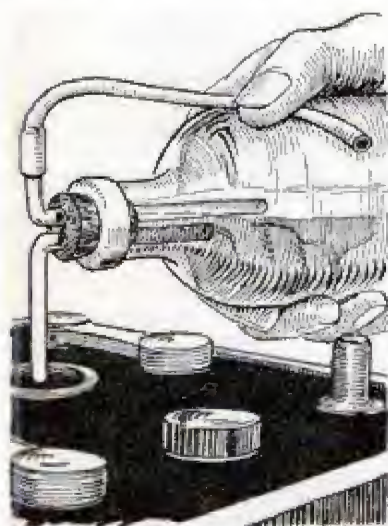
Always provide drainage around the tents and shelter, especially on slopes, or the floor and the bedding may be flooded. Tent poles need not be taken in the woods. For an A-tent, have a rope long enough to serve as a ridgepole, knotted inside of each end grommet of the tent and having at least 10 ft. to spare at each end, to be tied around an improvised pole and then guyed to a ground peg. Often a tree serves for the end away from the fire.

Nails for Copper Screen

When making copper-wire screens it is advisable to attach the screen to the frames with copper tacks. If iron tacks are used, an electrolytic action will take place in the presence of moisture and this will destroy either the tacks or the screen at the point of contact, allowing the screen to come loose and sag, which in turn makes a repair necessary. Only pure copper tacks, not copperplated ones, should be used for this purpose. To determine whether or not the tack is solid copper, scrape it with a file or cut off the end with a pair of pliers. If the tacks are of pure copper, they will show the characteristic copper color throughout. They are also much softer than iron tacks.

Adding Distilled Water to Battery

Most auto owners have experienced some inconvenience when adding distilled water to storage batteries. However, the difficulty can readily be overcome by using the handy filling device shown in the drawing. It consists of a bottle, two lengths of small glass tubing and a short piece of rubber tubing. Two holes are drilled through the cork for the glass tubes, but



before they are inserted, they are heated and bent to the shape shown. The rubber tubing is then slipped over the end of one as shown. Pressing this tube shuts off the air from the bottle and prevents the distilled water from flowing out. By using this filler, there will be no water spilled over the top of the battery.

☛ A No. 10 gauge shotgun cartridge shell, telescoped with a No. 12 gauge shell, forms a convenient match safe for campers, or other persons out of doors, and is moisture-proof.

Holding Small Parts Is an Easy Matter with This Improved Quick-Acting Clamp



Improved Quick-Acting Clamp

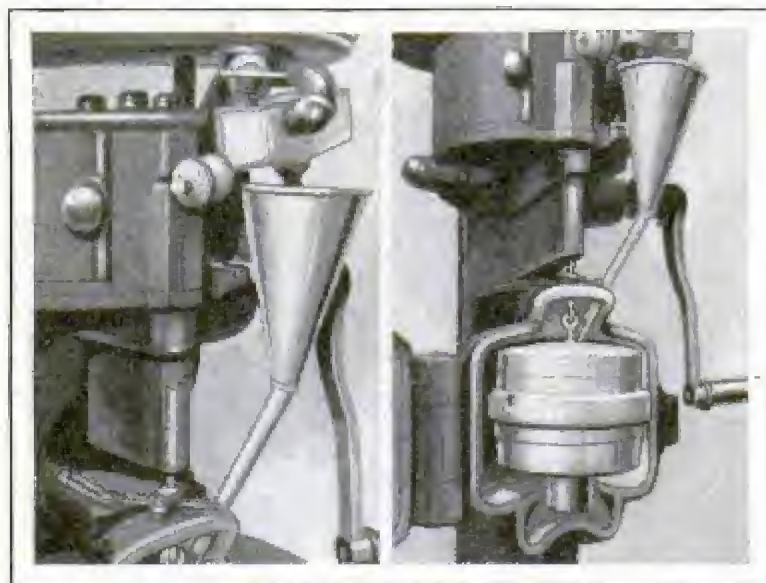
In an electrical shop, it was necessary to solder and fit a large number of small pieces. To loosen and tighten the vise each time a piece was removed and reinserted, was found inconvenient, so the method of holding the parts by means of a pair of heavy pliers, as shown in the illustration, was used and found entirely satisfactory. One handle of the pliers was caught in the vise, while a length of pipe, with a weight on the end, was slipped over the free handle. The work, held in the jaws of the pliers, can be instantly released by merely lifting up the weighted handle.—G. A. Luers, Washington, D. C.

How to Clean Celluloid Side Curtains

After the auto side curtains have been lying in a tool compartment for some time it is often necessary to clean the celluloid "lights," as they have become scratched and dirty, making them more or less opaque. This can readily be remedied by applying liquid metal polish or furniture polish. The cleaning should be done with a rotary movement, starting in the center and gradually increasing the diameter of the circles.

Improving the Cream Separator

The efficiency of the cream separator shown in the photos was increased considerably by two little devices that anyone



A Few Changes in the Cream Separator That Make It More Efficient and Sanitary

able to use a soldering iron can make. The left-hand photo shows the milk regulator in position for use. It operates on two pivots, one on each side, which rest in V-shaped notches in the frame. A slight rap was sufficient to put it out of position, so that enough milk did not enter the bowl, resulting in a clogged machine. To remedy this, a partition made of galvanized iron was placed in the outside notch of the frame, with supporting strips encircling the hanger, and soldered together at the ends. A drop of solder was also placed in the notch, and attached to the partition to serve as a brace. After this was done, the machine separated perfectly. The right-hand photo shows the same machine with a funnel in position for use. While the full flow of milk was entering the bowl, this worked very well, but the tube of the funnel was made so short that the drippings would fall outside of the bowl en-

trance, run down onto the bowl-clamping ring and onto the floor when the bowl was removed for washing. A little spout of galvanized iron, soldered to the outside of the tube at the bottom and extending down just $\frac{3}{4}$ in. to the bowl entrance, remedied this. The machine now was entirely sanitary.

Ball-Bearing Crankshaft Makes Window Display

An auto dealer used a novel method of demonstrating the ease with which a ball-bearing crankshaft would turn. The crankshaft was suspended from the ceiling of a show-room window by means of two small wires attached to the bearings. Much to the amazement of the passers-by the crankshaft revolved continuously without any apparent drive. The secret of the drive was a strong blast of air from a small blower concealed in the display. The air was directed into a small cardboard outlet, concealed next to one of the counterbalances on the crankshaft. The crankshaft would continue to revolve until the air supply was shut off. All articles that would be affected by the air were removed.

Darkroom for the Camp

When you wish to develop photos in camp, take a piece of dark-red celluloid along and use it to make a shade. It should be about $1\frac{1}{4}$ in. wide and 6 in. long. After bending it to a cylindrical shape so that it will just slip over the dash light, wrap a narrow strip of tape around each end. The same idea can be used with a flashlight. When developing in the car, spread a robe or blanket from the dash over the back of the front seat, and the darkroom is ready.—L. S. Christison, Disman, Wash.



Red-Celluloid Shield over Dash Lamp Gives Ruby Light for Developing at Camp

How to Make Porcelain Letters Stick

Trouble is often experienced with porcelain and glass letters coming off windows to which they are cemented. A good method of eliminating this trouble is to clean the window thoroughly where the sign is to be located. This should be done with soap and water so that every trace of grease will disappear. Then apply a coating of white paint, covering a space about 4 in. larger than the space to be occupied by the letters. Let this coating dry for 24 hours, or longer, and then apply the letters in the usual way. After the cement has dried thoroughly, remove all the surplus paint around the letters with a scraper or a razor blade. Be careful, however, not to get under the letters as this will make a crack, permitting the entrance of water, which will loosen them. By applying paint as just described, the appearance of the letters from the inside will be improved considerably.

Lard Pail Makes Calf Weaner

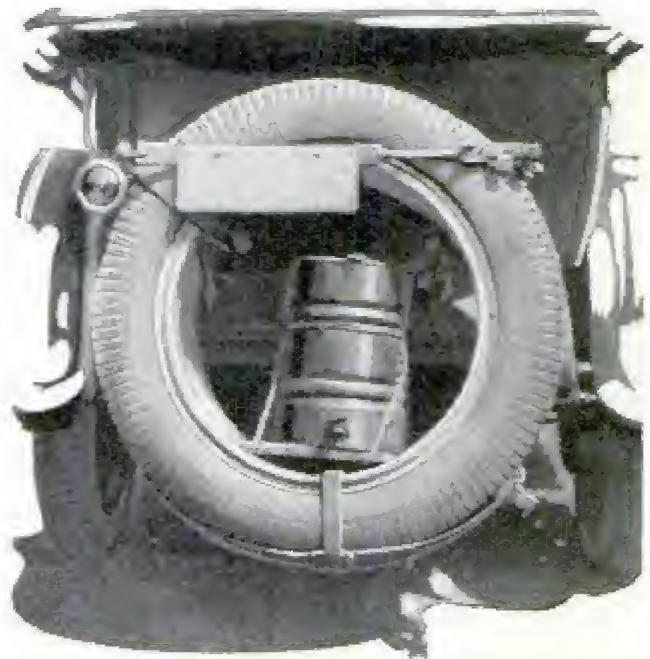
Calf weaners can be made from 5-lb. lard pails and will be found entirely satisfactory. About two-thirds of the bucket is used for the weaner, as shown. Bend the bottom out a little to fit over the nose.



Attach straps to the two corners at the rim. The straps must reach back to the calf's neck and have loops at the end so that a third strap can be slipped through to go around the

neck. A length of wire fastened to the lower edge prevents the calf from raising the weaner beyond the nose but not from grazing. It is advisable, of course, to remove the burr from the sharp edge of the tin with a file, or double it back to form a bead and then solder it.

Ⓐ column of water 27.6 in. high will have a pressure of 1 lb. per square inch.



Mounting a Small Oilcan on Spare Tire Saves Space When on a Long Trip

Carrying Oilcan on Long Trip

When motoring through some sections of the country it is impossible to get oil when necessary, or to get the particular kind of oil desired. By placing an oil drum on a short board and setting it on the spare tire, as shown in the photo, it will be out of the way and will not make a mess on the running board. The spigot projects at the back far enough to allow the oil to be drawn out without spilling any on the tire.—Carlton Groat, The Dalles, Oreg.

Skinning Small Animals

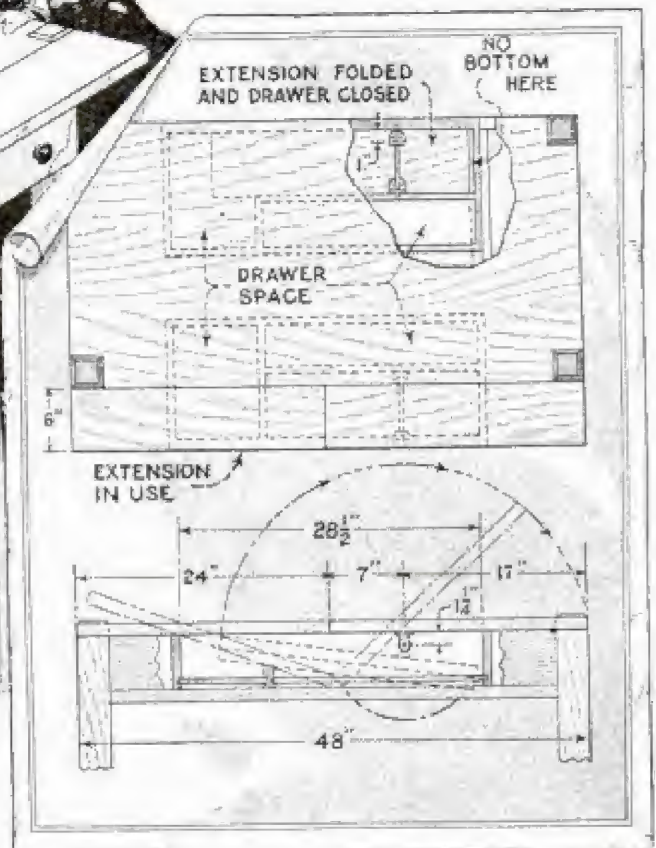
Some trappers use a trick in skinning small animals that is not generally known. They carry a small metal pipe 6 or 8 in. long, and, on killing a mink, weasel or other small fur-bearing animal, and while the body is still warm, they make a small slit on the inside of the hind leg, large enough to admit the tip of the metal pipe. By holding the skin about the pipe to make an air-tight joint, the skin can literally be blown free from the animal, clear out to the tip of the nose, with a little assistance in loosening it, making the task of skinning simpler and quicker. A pocket bicycle pump could readily be adapted for this purpose, and carried along on the trap-line route.—Harold E. Benson, Denver, Colorado.



Combined Library and Dining Table

In small apartments, it is often necessary for one piece of furniture to meet several requirements, and library tables must sometimes also be used for other purposes than that for which they are really intended. If a library table has a drawer on each side, it can readily be converted into

a dining table. Pull out the drawers and build a folding leaf to fit inside of each when collapsed, and over the drawers when in use, as indicated in the drawing. Each leaf consists of two equal pieces, hinged together, and one of these pieces is in turn arranged to pivot at its end, inside of the drawer. When in use, the leaf rests on the top of the drawer



and also on the rod to which one piece is pivoted. Each leaf should be about 1 ft. wide and just as long as the table. The bottom of the drawer below the leaf is removed so that the end of the leaf can swing down when unfolded.

Application for Small Wounds

Pure wintergreen oil makes a good local application for all small wounds, bites, scratches, abrasions, etc. There is no germ or microbe that can withstand this oil, and at the same time it is not injurious to the tissues. A few drops gently rubbed in where there is apt to be any infection is sufficient. An infection always follows the wound of a bullet or the scratch of a brass pin; with irritation extending up the

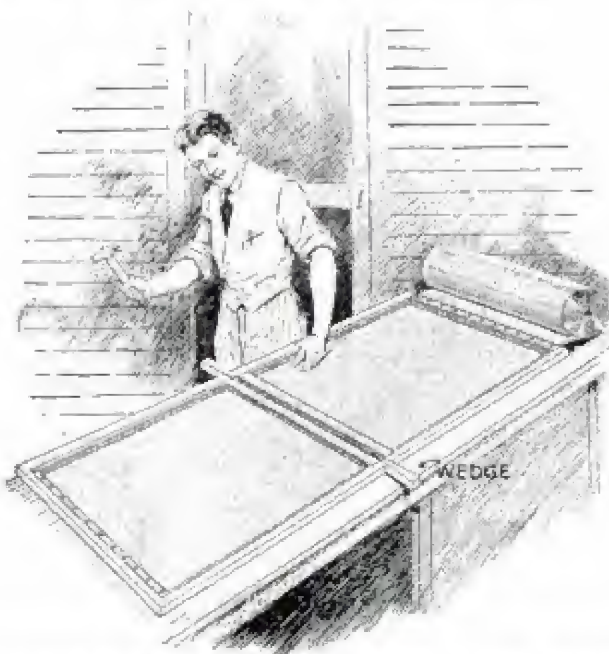
injured member, threatening tetanus or lockjaw. These symptoms are manifested by spasmodic pains which shoot upward, but are quickly subdued if the oil is applied along the track of the pain or infection. This oil is equally effective when locally applied to tendons or ligaments which have been unduly strained. An ounce of pure oil does not cost much and should be kept in every shop and household. If 5 or 10 per cent of olive oil is added, the oil will have more body and last longer.

Patching Inner Tube without Cement

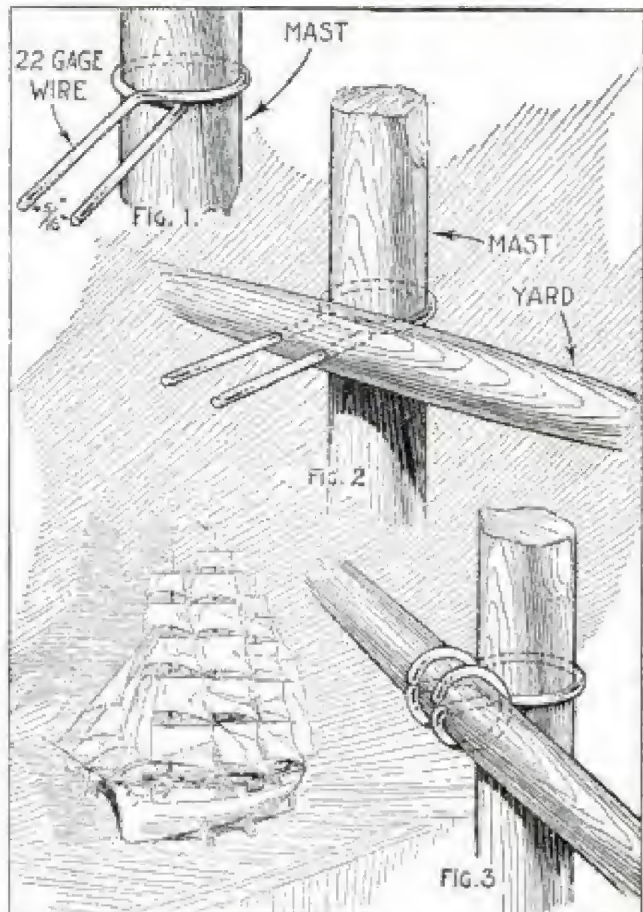
While on a country tour last summer, we had the misfortune to have a flat tire, and an examination of the repair kit revealed the fact that the liquid cement had evaporated beyond the point of usefulness. As a repair of some kind was necessary, one of the party suggested a simple method of vulcanizing. The punctured portion of the tube was roughed and cleaned, and a few drops of gasoline were poured upon it. This was ignited with a match and allowed to burn until consumed. The cold patch was then immediately applied, pressed firmly in place, and the repair was completed. The patch held until the tube was later removed for the repair of another puncture.—G. E. Hendrickson, Argyle, Wis.

How to Stretch Screens Tightly

Stretching screens tightly is an easy task if one goes about it in the right way. Place two frames end to end as shown in the drawing and pull the screen over the frames as indicated. Then, after tacking down the piece of screen at the far ends, drive small wooden wedges between the frames, or raise the tacked ends enough to permit the insertion of a $\frac{1}{2}$ -in. strip of wood, after which the frames are pushed down again. Either method will stretch the screen tightly and it can then be tacked down in the middle and trimmed off.



Practical and Easy Way of Stretching Screens Tightly over Frames



Simple Method of Slinging the Yards to the Masts in Making Model Ships

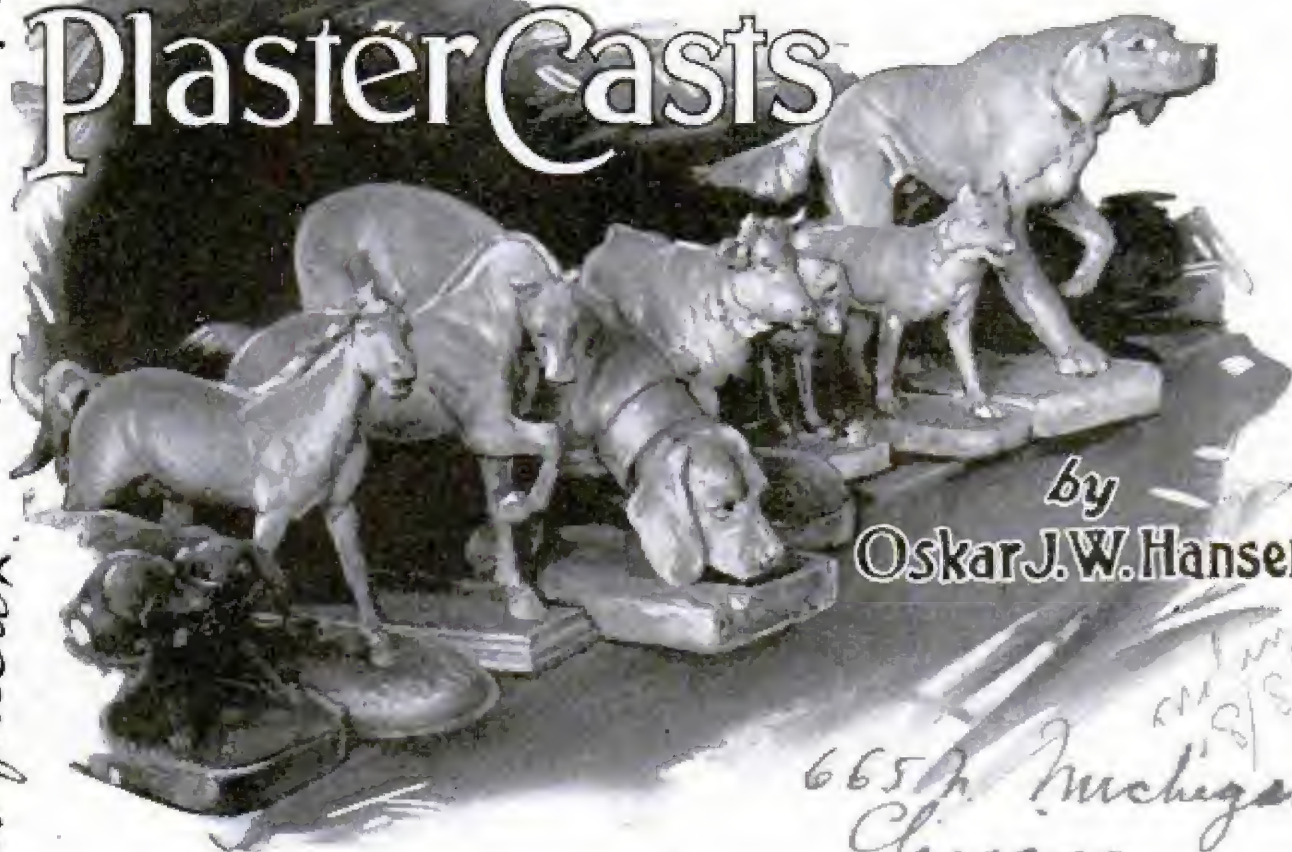
Slinging the Model-Ship Yards

When slinging yards to masts of model ships, the method of attaching them shown in the drawing will be found convenient. Get a piece of No. 22 gauge brass wire, about 3 in. long, form a ring around the mast and shape the ends as shown in Fig. 1. The parallel ends should be about $\frac{1}{4}$ in. apart. Drill two holes through the center part of the yard, using a No. 60 drill, spaced so that the yard will slide on the straight ends, as indicated in Fig. 2. To hold the yard securely to the mast, turn the straight ends of the wire completely around the yard and clip off the surplus wire. The yard is then slung to the mast correctly, as shown in Fig. 3, and should be attached so that it can be slid up or down when pulling on the halyards after the yard has been rigged. This method makes it easy to rig the yard with sails, etc., before slinging to the mast.—L. Edgar Davis, Syracuse, N. Y.

☛ Cover the top and side of ice in a refrigerator with a piece of canton flannel, and the ice will last longer.

These casts can be made weatherproof by sealing with varnish or painting with white flat paint.

Make Your Own Plaster Casts



by
Oskar J. W. Hansen

665 N. Michigan
Chicago

THE art of plaster casting combines the practical and the beautiful. Its fundamental mechanics are simple, and the materials needed are few and inexpensive. The child can model animals and toy soldiers for the play house, and the older members of the family can beautify the home with artistic lamp bases, book ends, wall brackets and candlesticks. Copies can be made of beautiful art objects possessed by others. Molds can be made for concrete garden furniture, bird baths and sundials.

Those about to build a home can make a small model exactly to scale and paint it in the proper colors. This model can be constructed on a plot representing the lot, and the proper location of the building, sidewalks,

flower garden and service yard determined. A model of this kind will enable you to visualize the practical details much better than a blueprint and will eliminate costly and unsightly mistakes. These are only a few suggestions. The variety of things that can be made is practically unlimited.

It might be thought that a description of how to model in wax is unnecessary in this connection, but the first step in making an original plaster cast is always a model in wax, and, since the making of the mold is exactly the same either for the original or for copying another object, we can combine both the artistic and the practical. Not only this, but a little practice with this fascinating work will develop in many people artistic talents which they



Book Ends of This Type Can Be Made and Reproduced in any Quantity at Home

never knew they possessed, and in this way provide a most unusual form of profitable recreation.

In order to tell you in a simple way how to become familiar with the materials and their uses, I have selected the making of the pair of book ends, shown in Fig 1, as an example. The method illustrated is, of course, also used in the making of any of the other objects which you may wish to make, except, perhaps, for very large objects, where special reinforcing and bracing are necessary on account of the bulk and weight of the article.

The first model, as mentioned previously, is usually done either in modeling wax or in wet clay. A plaster mold is made from this model and from this a plaster or artificial-stone cast is taken. I will tell you how to make the modeling-wax model, and the plaster mold from it, and then how to make a "clover-rock" model from this mold, which will be the finished product. Clover rock is a very hard composition stone now used by dentists in making fine casts of teeth, and I have found that it is a very tough and beautiful material, which

can be used as an almost perfect imitation of marble. Also, when colored and finished suitably it makes a realistic substitute for bronze.

As a modeling wax I recommend either domestic or imported "plastiline." This is a specially prepared compound which always remains soft and pliable. If it seems a little hard as it comes out of the box, knead it between the palms of your hands. The heat and friction will soon bring it to the proper flexibility. This wax can be used over and over again and is a permanent investment.

For modeling tools, one or two small orange-wood sticks, like those used in manicuring, which can be cut into various shapes on the ends, are all that is needed.

Now take a smooth piece of board, or better still, a piece of plate glass, and begin making the wax model for your book ends. If the design is to be the same for both ends you need only make one model. This can be duplicated again and again. First you build up and form the main shape and then you model in the design.

You can always find many attractive de-



Imported by - E. L. S.
Soltmann
202 E 42nd St
New York
N.Y.
29
Chicago

Fig. 2. Sticking the Brass Shim Stock into the Edges of the Model; Fig. 3. One Side of the Mold Completed, Commencing Another Side

see letter - Hardite used instead of Clover Rock

signs in the public libraries in old books and illustrations. These you can copy by tracing and transfer lightly to



Fig. 4. Separating the Pieces of the Mold; Fig. 5. Tying Mold for Casting; Insert. Varnishing Mold Edges

your wax models. Then use these lines and, with your modeling tools and small pieces of soft wax, make them stand out in low relief. One way of heightening the relief effect without cutting into the model too deeply is to make the depression a little rougher than the higher parts. This catches and breaks up the light and gives a deeper shadow. You work carefully with the wax until it represents exactly the form you wish your finished work to have. Your model is then ready for the making of the mold.

The first thing to do in making a mold is to divide the wax model into several parts by making dividing walls with a very thin brass called "shim stock." This metal is carried by every automobile-repair shop. It is ordinarily used in the adjusting of connecting-rod bearings, etc. Cut this brass into small squares and make dividing walls by pushing the square about $\frac{1}{4}$ in. into the wax model. The purpose of these dividing walls is to enable you to make your mold in several pieces so that it can be taken apart without destroying either the original wax model or the finished cast which you will pour into it later. Locate the walls as in Figs. 2 and 3.

Next, mix a small quantity of fine dental plaster of paris with water, until it is of the consistency of cream and free from lumps. Then cover one of the sections you have made by the metal dividing walls on your wax model with the wet plaster. A good way is to make a sort of screen with some newspapers around the three sides of your model and then, with a large spoon, throw the thin plaster against the model. This gives the plaster a chance to get into the details of your modeling. It is also helpful to blow hard against the plaster and drive it into every crack and hole. As the plaster hardens, keep adding to the thickness of the mold until it is about 1 in. thick. It should then be allowed to harden.

Now remove the brass pieces from the sides of the pieces of plaster mold, taking care not to injure the wax model. Carefully dig a few half-spherical holes into the edges of the plaster mold. Then, with a fine camel's-hair brush, give the edges of the piece of mold a coat of sandarac varnish. This varnish is obtainable from any dental-supply house, and will act as a separating medium between the different pieces of the completed mold. The varnish dries in five minutes and then, to assure greater ease in taking the pieces apart later, you may go over the varnished surface with a thin coat of melted butter. Now take the pieces of brass and build another wall, as shown in Fig. 3, so as to enable you to build up another side of the mold, and repeat the process until every

Chicago Dental Supply Co.
240 N. Wabash

side of the wax model is covered except the bottom which rests upon the board or the glass. It is not necessary, of course, to form brass walls for the top piece, since the four sides of the mold serve as walls. Each of these sections should be put in with freshly mixed plaster, and the edge of each section should be varnished and greased before casting the next. The whole mold is now allowed to dry for fifteen minutes, after which it is opened.

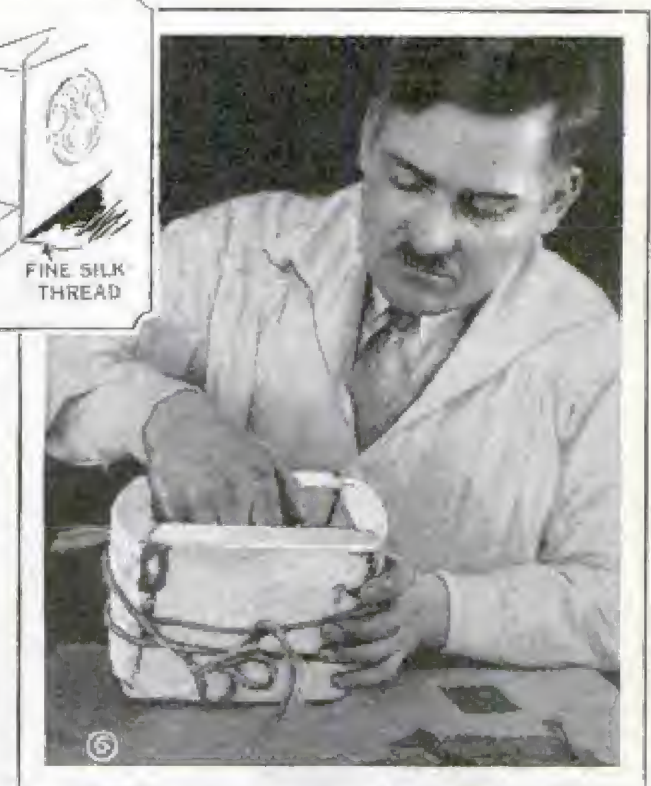
To open the mold, carefully remove it piece by piece, beginning with the piece last completed. If you have done your work carefully and divided the mold right, it should come off without any appreciable damage to the wax model. The pieces can be carefully loosened with a putty knife; see Fig. 4. The mold is now cleaned carefully from any small pieces of clinging wax and then it is varnished on the inside with the sandarac varnish and greased with butter like the edges. The mold is then reassembled and tied together securely with a strong cord, as in Fig. 5, and it is then ready to be filled with the clover rock for the final cast.

This material comes in the form of a fine white powder. Measure out enough to fill your mold and to this add water to make a thin paste. Mix this thoroughly until it is entirely free from lumps. You may take your time about this work, as the clover rock will not set for about three-quarters of an hour. Turn your mold upside down and with your finger tips shake a small quantity of the paste into the bottom of the mold, as in Fig. 6. This work should be done slowly and deliberately, as the shaking prevents any air holes from forming and also gives a finer and harder surface to the finished cast.

When the mold is completely filled, let it set for three hours. At the end of this time, you should make the bottom of the cast smooth and square with a sharp knife. The cast is then allowed to set for a total of twenty-four hours. Do not try to force the setting by drying the cast, or by placing it in the sun; that would destroy the material. Let it set naturally in a cold, moist place. On the following day, the mold is opened. This is done by tapping it lightly all over the surface with a piece

of wood so as to loosen it completely from the cast. Then, taking it apart by removing it piece by piece, in the same manner as it was removed from the wax model, you can preserve the mold intact, and by applying another coat of the melted butter, it is ready to be filled again. In this way you can make a great number of book ends, depending upon the care with which you handle the mold.

In making a copy of an existing art object, the procedure may be slightly different. It is obvious that an object with a fine finish cannot be subjected to greasing and a direct contact with the plaster, although many commoner objects can. The best method is to make an impression in wax. The modeling wax repels water, since it is oily, and because of this a slight moistening of the surface of the object to be copied will prevent the wax from sticking and will give you a firm, clean impression. The main problem is to remove the wax from the object without pulling the impression out of shape. It is therefore best to arrange it so that it can be removed



Shaking In the First Material; Insert Shows How Wax Is Separated When Taking Off Wax Mold

in comparatively small pieces and fitted together afterward. This is done in the following manner: Take some fine silk thread and, by moistening it, make it ad-

here to the surface of the object to be copied exactly along the lines where you will want the wax to separate. Then, after moistening the entire surface of the object to be copied, press the soft wax firmly against it until it is entirely covered. In placing the silk threads, you should leave the ends sticking out of the wax, as indicated above, Fig. 6, and, after the wax covers the model, you cut it in sections by pulling gently at both ends of the silk threads. The threads will cut the wax and allow it to be removed.

You now have a wax mold from which a clover-rock model can be made in the same manner as from a plaster mold. Only one cast should be taken from this wax mold as it is very hard to keep it in shape. For large objects, a wax mold should be given a backing by applying an outside casing of plaster of paris.

It is often desirable to use the first-finished cast as a master pattern for the making of new molds. In this way many more reproductions can be made. The master cast is varnished and greased as described for the molds. Fresh piece molds can then be continuously made in the same manner as from the wax model, with the exception of the substituting of a wall of model-

ing wax for the shim stock. This completes the directions for the making of simple molds, and having made finished casts of your book ends, we will now take up the matter of finishes.

Of course, no matter how carefully you prepare your molds, there will be fine hair-lines in the cast where the mold was joined. Carefully smooth these places with a sharp knife and a piece of fine sandpaper. If, by any chance, through lack of care and experience, your cast shows any small air holes, these can quickly be filled with some freshly dissolved clover rock and made smooth. A good way to do this is to make the mix very thin and apply it to the defective place with a small water-color brush. Your cast should now be a smooth velvet-white with a texture like a piece of Vermont marble. It can be used in this way, or finished to imitate bronze.

To give a fine imitation of bronze, purchase some dark-gold satin-finish bronze powder. Mix a small quantity with half shellac and half denatured alcohol and apply to your cast with a fine camel's-hair brush. You can now tone this finish with any colors you may desire, to imitate aged bronze, the principal shades being dark brown or dark and light greens. To a



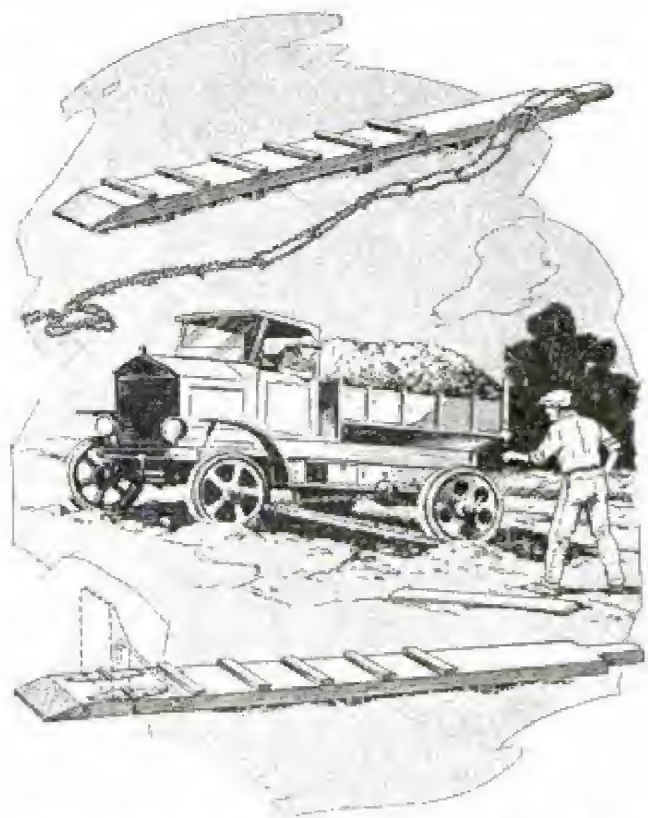
The Methods Described Here Are Exactly Those Used by the Sculptor in Making Plaster Copies of Fine Busts, Such as the One Shown Above

small quantity of turpentine add some dry color of the shade desired and give a very even wash over the metal-finished surface. Now let this dry, after which you can apply a very thin coat of ordinary floor wax. The wax should be rubbed on with your hands, which will cause some of the colored wash to be carried off the high places and the metal coating to show through. The finished effect will be that of aged bronze. If your design is architectural, like the book ends shown in the illustrations, you can heighten the effect by a touch of color in the depressions and the moldings. The shadings and finishes obtained in this manner are only dependent upon your ingenuity in coloring. A little cleverness and patience will give you a product that will have all the appearance and wearing qualities of a real bronze.

The final step is to glue a piece of felt to the bottom and back of your book ends. This will save your furniture from being scratched. You can now pride yourself upon having made an original contribution to usefulness and to art. The experience gained will enable you to give your home those touches of artistic individuality which create an atmosphere that is the distinctive result of the efforts of your own genius.

Link Makes Trap Safe

Many trappers of wild game have suffered the unpleasant experience of having one or more fingers nipped while setting or baiting steel traps. A safety device used by a Wisconsin trapper to avoid such accidents is shown in the illustration. A sliding link, made of stout steel wire, is slipped over the chain so that it may be drawn down over the compressed spring where it will prevent the jaws from closing accidentally while the bait pan is being adjusted or baited. After the trap has been set and placed in the desired position, the link is slid back.—G. E. Hendrickson, Argyle, Wis.



Cleated Boards Effectively Help the Truck Driver Out of a Mud Hole

Getting the Truck Out of a Mud Hole

Much time and energy are wasted by motorists in trying to remove automobiles and trucks from mud holes or ruts, especially when the automobile or truck carries a heavy load. One truck operator found that this can easily be done by means of two cleated boards of suitable length and width, as shown, placed at the foot of each rear wheel. The other end of the board is raised to about the same height as the rear axle, and a chain tied to the raised end and the rear axle. The board should be forced under the front part of the rear wheel to get the necessary traction. When the roads are exceedingly muddy, a second type of board, as shown below, which has a hinged piece to prevent the wheel from slipping off again after it is once on, will be found more serviceable. The boards can be conveniently carried on the running boards.—A. Bereskin, Winnipeg, Can.

¶An excellent method of closing a crack in a wall before papering is to paste a thin strip of linen over the crack. This not only makes a smooth job, but prevents the paper from being torn if the crack should widen.



Backrests on Coaster Wagon Prevent Children from Falling Out Easily

Backrests for Coaster Wagon

When giving small children a ride in a coaster wagon, they sometimes find it hard to maintain their balance and the provision of simple boards to serve as backrests will be of considerable aid. These may be attached permanently to the coaster, in such a way that they will not interfere with the use of the wagon for other purposes. They are hinged to the bottom, as shown in the detail, and can be folded to lie on the bottom when not in use.—Harry C. Jackson, Chicago, Ill.

Magnetic Suspension Pendulum

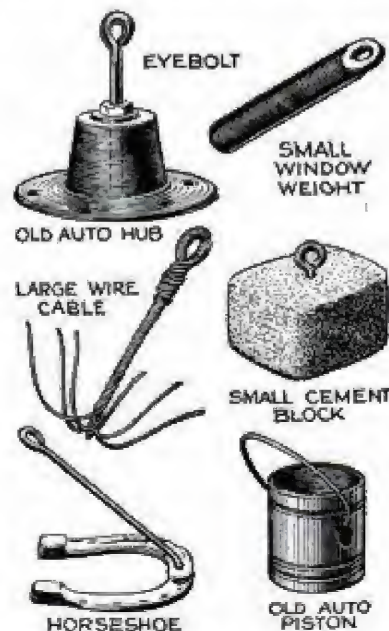
When a pendulum is not periodically supplied with energy its amplitude grows smaller and finally the motion ceases, due to the resistance of the air and the friction at the point of suspension. Usually the suspension is in the form of a knife-edge bearing against plates of agate. Sometimes the pendulum rod is simply attached to a very slender and flexible spring without any bearings. But the minimum of friction is obtained by means of magnetic suspension, as the following experiment will prove. If the rod of a pendulum about

12 in. long, beating half seconds, is sharpened to a needle point and suspended from one of the poles of a magnet, it will be found that, if set into motion, it will continue to swing fifteen times as long as the ordinary knife-edge suspended pendulum, and it will not stop until after about 16 hours, while one working on agate plates will stop in from 50 to 60 minutes. Similarly a top, provided with a fine-pointed axis of iron, will spin much longer when suspended from a magnet. Magnetic suspension is used in precision instruments; for example, the small mirrors which are used in certain telegraph systems to register writing photographically.

Anchoring Decoys

One of the problems of the duck hunter is the anchoring of his decoys. Rocks can be used for this purpose but it will be found much more convenient to use one of the anchors shown in the illustration. A discarded auto-wheel hub can be used by running a long eyebolt through the bearing and fastening it with a nut on the bottom. Sash weights also make good

anchors, but owe their holding power more to weight than shape. A short length of twisted wire cable, turned into an eye at one end and with a few strands at the other untwisted and bent up as flukes, makes a very good anchor. Small



concrete blocks are good weights and can be quickly and easily made. Dig several small, square holes in clay ground and place an eyebolt in each. Then pour in concrete and let it harden for a week or more. Horseshoes with a long eyebolt clamped angularly to each and old automobile pistons with a wire bail also are serviceable anchors.



All Shop Notes published in 1926, in book form—Fifty Cents—from our Book Department

How to Refinish Old Soft-Wood Floors

By C. M. OWENS

OLD floors that are worn or have been painted can readily be refinished by anyone who carefully follows the instructions contained in this article. First of all, see that the surface of the floor is clean, free from wax, polish, grease or dirt, and is thoroughly dry. If there is wax or polish on the floor, the best method of removing it is to use benzine or gasoline. Washing the floor with water and strong soap will also help considerably. However, be sure to rinse it well, for soap water is as harmful as wax or grease in preventing the paint or varnish from drying.

Then give the floor a coat of ground color. This can be purchased at any paint store or can be made by mixing white lead

with turpentine and a small amount of japan drier.

In order to obtain the proper color, add 1 lb. of yellow ocher to 10 lb. of white lead, using about $\frac{1}{2}$ gal. of turpentine for this amount of lead. It should be about as thick as cream after it is thoroughly mixed. Strain it through a piece of cheesecloth or fine screen wire. If the wood has no paint or finish on it, apply one coat and let it dry for about 24 hours.

If there are cracks to be filled, this must be done after the first coat of ground color



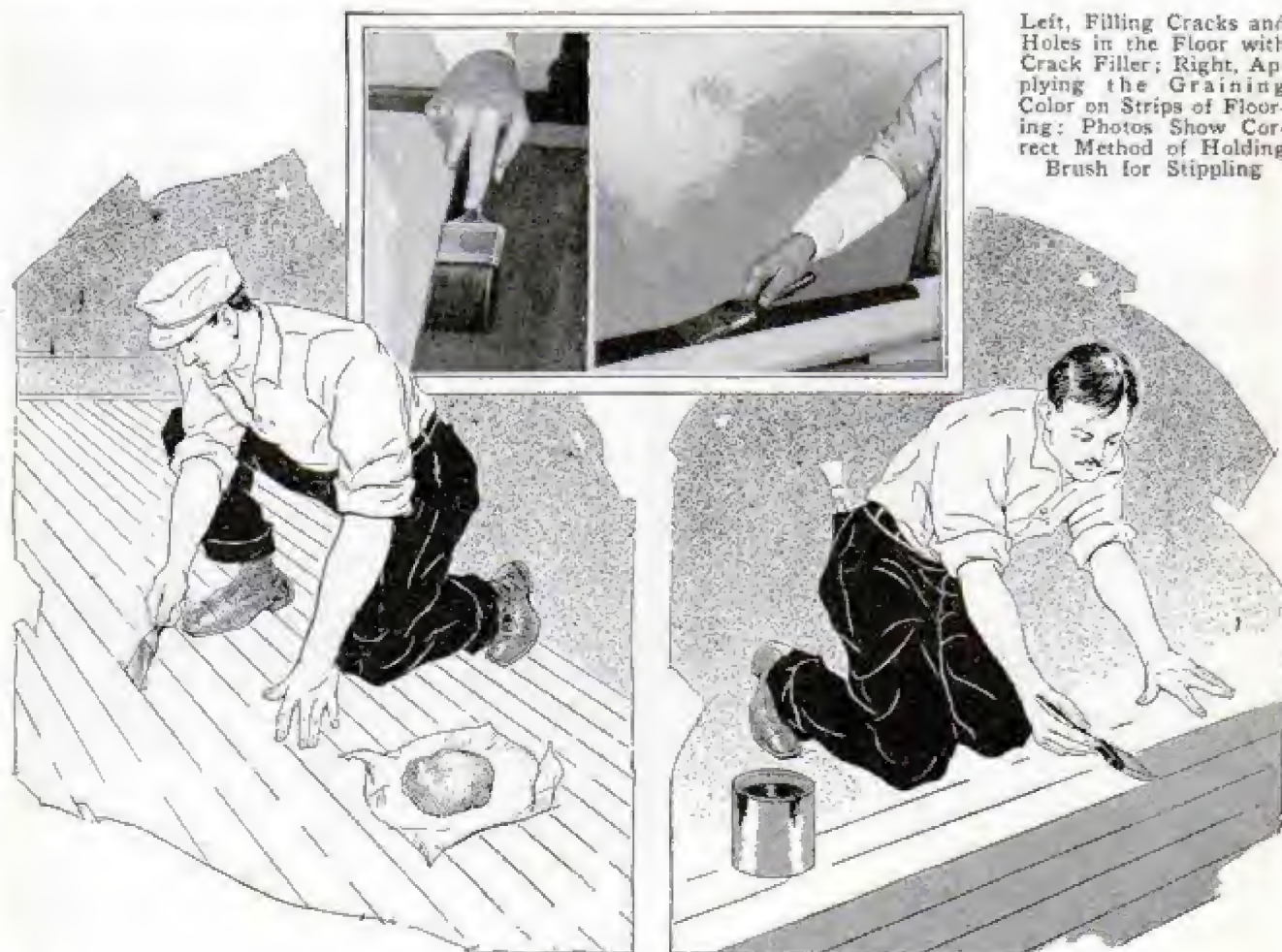
Left, Cleaning Off Dirt, Wax and Grease from an Old Floor with Benzine; Right, Applying the Ground Color on the Cleaned Floor

is applied and is thoroughly dry. Never put crack filler or putty on bare wood, as the dry wood will draw the oil out of the filler and leave only the dry pigment, which will shrink and come out. There are several crack fillers that can be bought at the paint stores, but a good one can be made by mixing white lead and putty, equal parts, and adding whiting to make it thick enough to use with a putty knife. Force it into the cracks and wipe the surplus off on the edge of the boards. Let the filler dry four or five hours before applying the second coat of color. This coat should be allowed to dry longer than the first coat, for if one coat of any kind of paint or varnish is applied over another coat before it is dry, the lower coat, upon drying, will cause the top coat to crack or "alligator." If the floor has paint or varnish on it and you do not wish to remove it, clean it thoroughly as explained above. If there are worn or bare places, give them a coat of the ground color, let it dry, fill the cracks and then apply a coat of ground color over the entire floor. If you get a uniform coat on with the one coat, that is all that

is necessary, but if this is not the case, apply a second coat.

The graining color can also be purchased, but only in one color—light oak. However, you can make it yourself in any shade. The colors are sold in powdered form and the pigments used to imitate different kinds of wood are as follows: Light oak, raw sienna; dark oak, burnt umber; walnut, Van Dyke brown or burnt umber and drop black; light mahogany, rose lake; dark mahogany, rose lake and drop black; cherry or redwood, burnt sienna and raw sienna.

You should use 1 lb. of dry color to each $\frac{1}{2}$ gal. of any kind of ordinary vinegar to make a graining color or compound. The thinner the liquid is, the lighter the color of the finish will be, and so you can add as much vinegar as you want until the desired shade is obtained. Put the powder into a pail, add a small amount of vinegar at first to make a sort of paste, which will facilitate mixing the powder with the rest of the vinegar. When the color is wet, it is about the shade it will be when the varnish is applied over it.

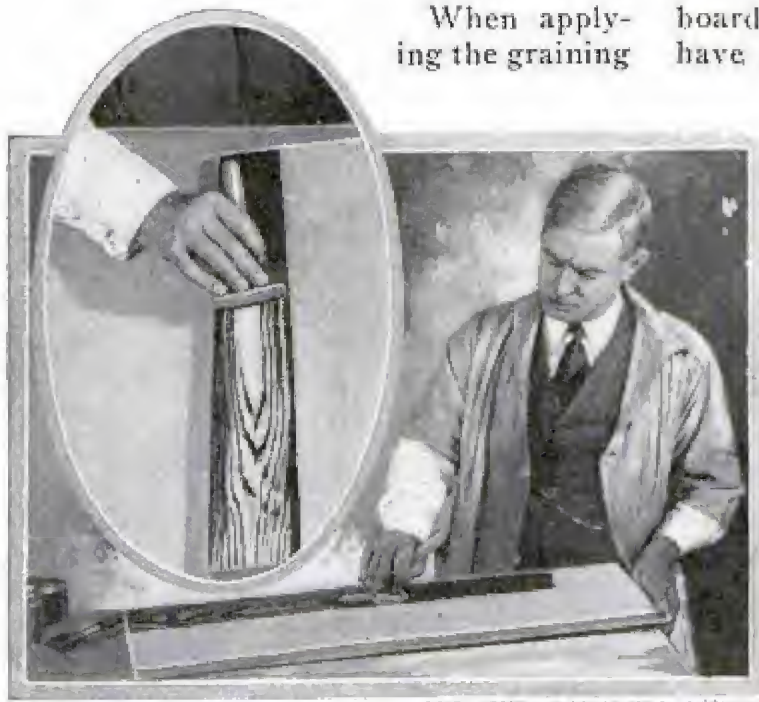


Left, Filling Cracks and Holes in the Floor with Crack Filler; Right, Applying the Graining Color on Strips of Flooring: Photos Show Correct Method of Holding Brush for Stippling

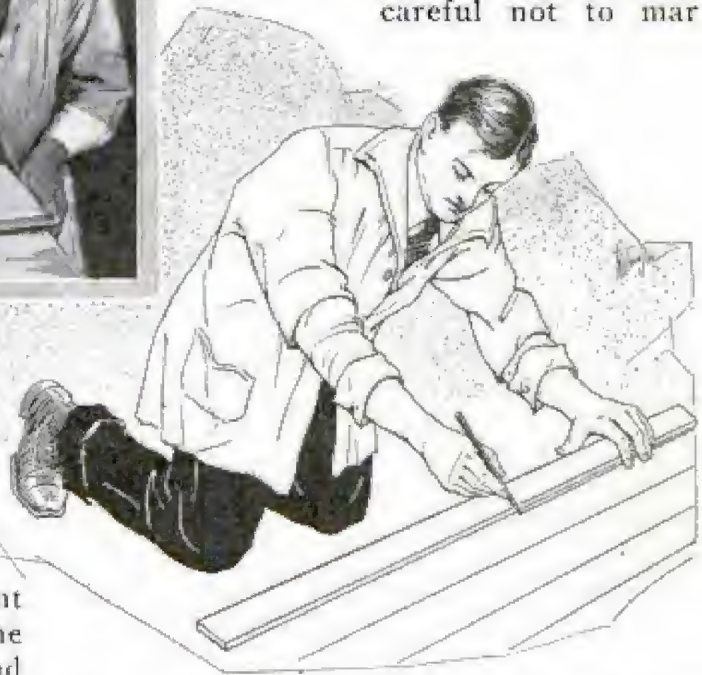
When applying the graining

boards. If you are not satisfied after you have done some of the flooring, wash it off with water and try again. This can only be done before the varnish is applied. It is a good idea to first practice on some boards or a small floor.

After the graining color has dried, which only takes a few minutes, it is ready for a coat of varnish. You must be careful not to mar



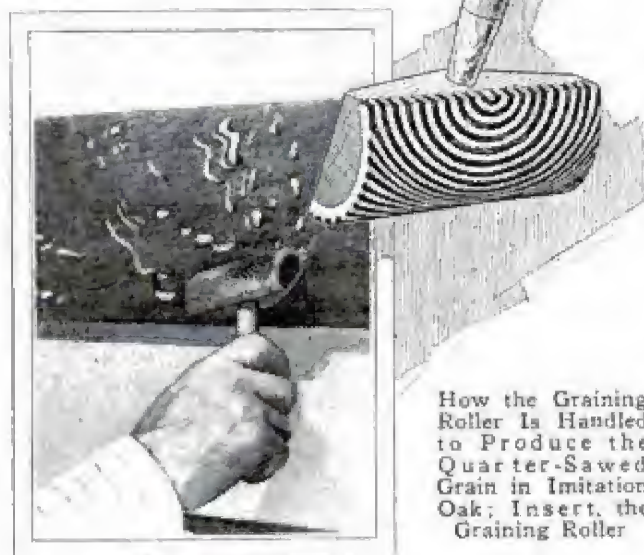
Upper Left, How the Roller Is Used to Imitate Natural Wood; Right, Drawing a Line Lengthwise over Center of Wide Floor Boards Produces Effect of Narrow Flooring



compound, it is better for two persons to do the work, for one can do the painting while the other does the stippling or graining. Only paint two or three boards, the full length of the room, at a time, as the graining compound dries quickly. Brush it out very thin, for if too much is applied on the surface, it cannot be stippled. After you have done about 3 or 4 ft., use a long-bristle brush to do the stippling. There is a brush made for this purpose, called a walnut stippler, but any long-bristle brush, as an ordinary calcimine brush, can be used for the purpose. The stippling is done by tapping the wet graining color with the flat side of the brush, always pushing it away from you. Try to use the same force in tapping and also the same amount of tapping all the time, for if you tap more in some places than in others the former places will be lighter. After you have done the entire length of the painted boards, take a damp cloth or sponge and make a clean edge along the boards you have just finished. When applying the color to the next stretch you must only come up to this edge or there will be a "lap," that will show up plainly when the varnish is applied. Also be careful, when stippling the remainder, not to get over on the dried

this coat. You can walk on it, but it is well to take off your shoes, or pull an old pair of heavy socks over them, if you do so. If the floor consists of wide boards, you can make a wonderful improvement by taking a carpenter's lead pencil and drawing a line lengthwise down the center of each board before applying the varnish, as this will give the appearance of narrow oak flooring to some extent. Now give the floor a coat of floor varnish, let it dry for 48 hours and then apply another coat. The second coat adds to the wearing quality, for as soon as you wear through the varnish, the graining color will begin to be scuffed off. Remember that you have to apply an additional coat of varnish occasionally, to replace that which wears off. With a little practice, you will be able to make a very nice finish, not only on your floors but also on other woodwork and furniture. This stippled finish is exactly the same as that often seen on the interior of railroad coaches and street cars, on cash registers, elevators, lockers, etc.

There is another effect to be had with the same materials. It is called graining, and the object is to imitate the natural wood. This is often thought to be a job for only the professional painter, but there



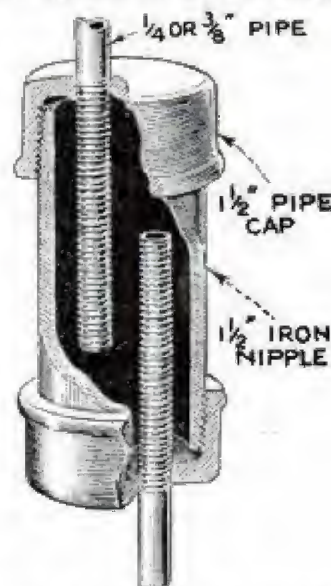
is a tool on the market called the graining roller, which anyone can handle, and which gives good results in the hands of the amateur. You can produce a grained effect by merely drawing this roller over the graining color while it is wet, in the manner shown in the illustrations, and it will make a good imitation of natural wood. The same method of preparing the surface and finishing is used as in the stippled work, only the roller is used instead of the stippler. A coat of good prepared floor wax, applied every few weeks to the varnished floor, will add to its wear considerably. A good method of applying the wax is to use a piece of muslin, not too thin and about 18 in. square. Put about $\frac{1}{2}$ lb. of wax in the center, gather up the corners and tie a string around it forming a ball of wax. Rub this over the surface and you will find that the wax will seep out in just the right amount, for you must not put it on too thick. After it has dried for about half an hour, polish it with a brush or a woolen rag. If the wax in the ball gets hard when not in use, put it in a warm place for a few minutes.

If you do not care to use the methods described above, there is still another way of finishing floors. If you have a dark floor and want to make it lighter, apply the ground color as directed, then give a coat of varnish stain, which can be pur-

chased at any paint or hardware store. When dry, apply a coat of floor varnish. Another method is the application of ordinary floor paint, which can be had in almost any color. A great many of the floor paints are made with varnish, which is much better than ordinary paint. One or two coats of a good floor paint will make a great difference in an old floor. You can varnish and wax over floor paint just as over any other varnished finish.

Steam Trap for a Boiler

Many years ago, before molded-lead traps came into general use, plumbers made sheet-lead box traps for use on waste pipes from baths, sinks, etc. I used the same method with success as a trap to prevent steam from entering the hollow copper spring of a pressure gauge on a steam boiler. It is much easier to make a box trap than it is to make the bent-pipe traps often used. The illustration shows how it is constructed. It consists of a $1\frac{1}{2}$ -in. pipe nipple, 4 in. long, fitted with a cap at each end. The caps are drilled and tapped for lengths of $\frac{1}{4}$ or $\frac{3}{8}$ -in. pipe, which are installed as shown, the top one connecting with the pressure gauge and the other to the water column, or elsewhere, as desired. Steam coming in through the lower pipe into the chamber forces water up the top pipe. A box trap can be cleaned much more easily than one made of bent pipe.—James E. Noble, Toronto, Can.



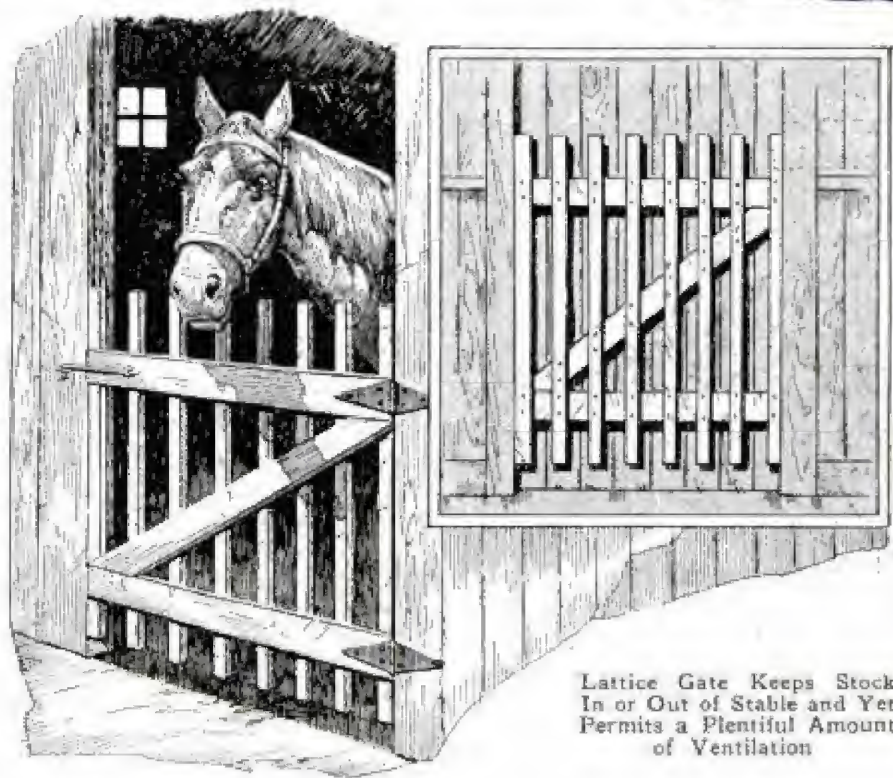
Depth Cutting in a Lathe

There are numerous other methods of cutting to a certain depth in the lathe than that of using a depth gauge. The gauge process of finding the proper depth requires cutting and trying several times before the result is obtained. Sometimes the compound rest is set at an angle of

30° for thread cutting, and is left in that position, unless some other angle is required. Where the compound rest is graduated on the lathe, the depth can be obtained by simply multiplying the required depth by 2. The sine of 30° being .5, the compound rest would have to move 1 in. in order to make the tool move in $\frac{1}{2}$ in. Take for a more comprehensive illustration an equilateral triangle, the sides of which are 1 in. long, the angle being 60°. One-half of this would be 30°, hypotenuse 1 in. and the opposite side $\frac{1}{2}$ in. The hypotenuse represents the center line of the compound rest. Another method is to set the compound rest at zero (any angle) and run the carriage up until the tool just touches the work, lock the carriage and run the compound rest out until you can "feel" with a piece of cold-rolled steel of the required size. Then unlock the carriage and run it up until it touches and locks again. Feed the compound rest in toward the zero point and note the revolutions.

Still another method is to clamp a piece of stock with the square end on the lathe, where it will come against a clean, smooth surface of the carriage, put a piece the right size between them, lock the carriage and feed the compound rest up until it touches. Take out the piece and run the carriage to the stop. These methods have been used with success and have been found handy and simple.—John Home-wood, Chicago, Ill.

☞The word "diameter" when applied to gears is always understood to mean the pitch diameter.



Lattice Gate Keeps Stock In or Out of Stable and Yet Permits a Plentiful Amount of Ventilation

Lattice Gate for Stock Door

The drawing shows how an ordinary lattice gate, hinged to one edge of the stock door, will permit ventilation on hot days and yet keep the stock either in or out. The gate is made of 1 by 4-in. pieces for the horizontal members and also for the diagonal brace, and the vertical strips are $1\frac{1}{2}$ in. wide and $\frac{1}{2}$ in. thick.—Dale R. Van Horn, Walton, Nebr.

Quick Method of Moistening Envelopes

Many small firms who send out a large amount of mail will appreciate the quick method of moistening envelopes shown in the illustration. Lay all the envelopes, face down, with the flaps thrown back, one envelope overlapping the next as shown. Then take a lath or yardstick and use this to hold the envelopes down securely while running a moist brush over the gummed sections. It is then easy to seal the envelopes.



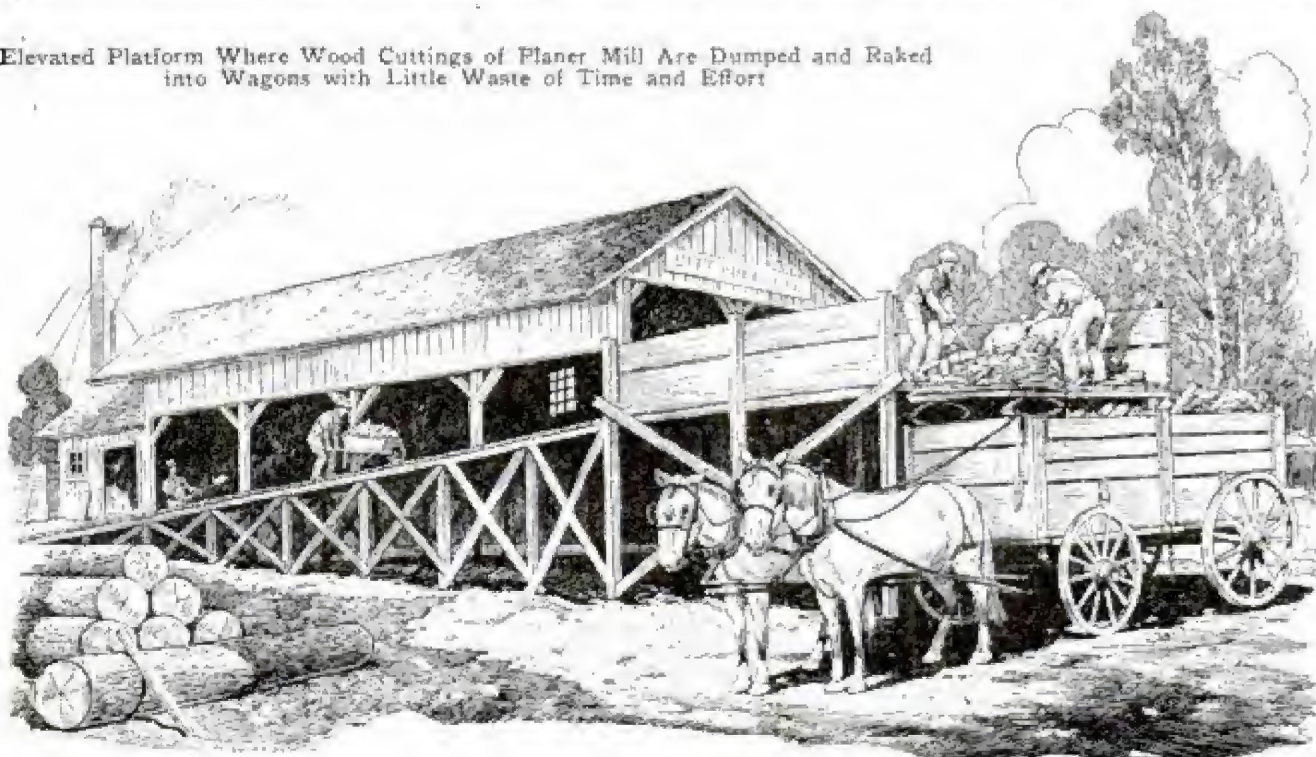
Quick and Easy Method of Moistening and Sealing a Large Number of Envelopes

Platform for Wood Trimmings

Every sawmill or planer mill produces more or less trimmings, and these make splendid fuel for cookstoves and fireplaces.

the illustration. It is 5 ft. high and has two sides to prevent the wood from falling off. A runway leads to it from the trim saws so that wheelbarrows can be rolled up on the platform. The wagons are

Elevated Platform Where Wood Cuttings of Planer Mill Are Dumped and Raked into Wagons with Little Waste of Time and Effort

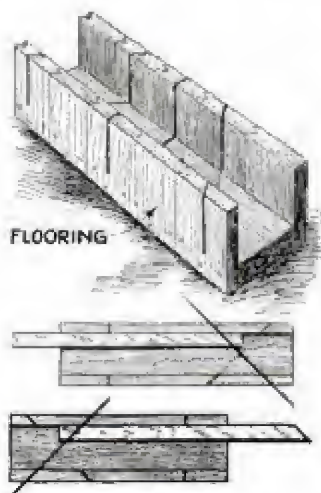


Most mills sell this by-product, but loading it into wagons for distribution is tedious and slow. To speed this work, one mill arranged a loading platform as shown in

driven under the open end of the platform, and a raker is used to push the wood into the wagon, which takes very little time and effort.—L. M. Jordan, Vredenburgh, Ala.

Improving the Miter Box

For over fifty years I have been making miter boxes in the usual way and have been annoyed at their getting out of true due to the sides warping or a piece splitting off, which makes the boxes useless. It occurred to me to make the sides with the grain of the wood vertical instead of horizontal. Such a box was made from cuttings of flooring and has remained in perfect condition for a long time. Also, it was usual to make the miter cuts opposite each other near one



end, and the square cut near the other end, as in the lower view. This involved reversing the box for cutting the two ends of the same stick. In the improved box, shown in the upper drawing, I made one miter cut in each end so that the box is right for all cuts without reversing, and the square cut was placed in the center.—G. M. Beerbower, Hollywood, Fla.

Threshing Wet Oats

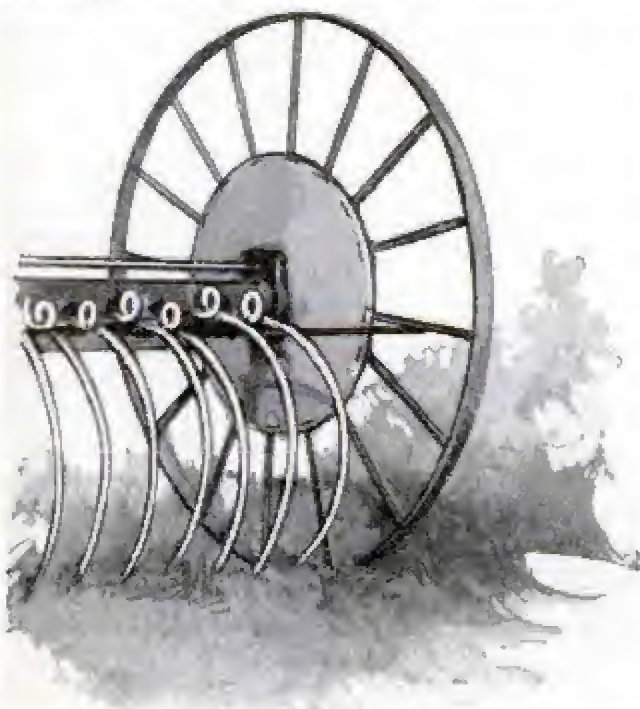
When trying to thresh a field of oats that had stood in mud for about two months of continual rain and fog, trouble was experienced, as the wet straw would clog up the separator and cause delay. The difficulty was overcome by sawing off the heads of wet bundles of oats with a buzz saw located near the separator. The cut-off heads were then thrown into the separator and the wet, rotted butts were thrown on a near-by pile.

"Killing" Alkali Spots in Plaster Walls

It is discouraging to the amateur painter, when working on plastered walls, to find spots that bleach out. This has driven many to papering when painting would otherwise be the best procedure. The condition can be overcome in the following way: Go to a drug store and get $\frac{1}{2}$ oz. of phenolphthalein. Put this substance in about 4 oz. of alcohol, either wood or grain. Shake the mixture well and, when dissolved, put about 20 or 30 drops in a gallon of glue size or water; it does not make any difference which of these two is used. Now coat the wall with the mixture. If there are any bad alkali spots in the wall, they will turn red under this application. Next, prepare a mixture consisting of 1 pt. of acetic acid and 4 pt. of water. When mixed, apply this to the spots, and if one application does not kill them, go over them again.

Non-Clogging Hay Rake

The average automatic-trip hay rake often clogs up with hay at the wheel hubs, fouling the cogs and ratchets and causing the teeth to trip unexpectedly. The photo shows a simple remedy. Two sheet-iron disks are fitted over the hub axle, and are fastened to the spokes with wire, threaded through holes punched in the disks.



Disks Prevent the Wheel Hubs of the Automatic-Trip Hay Rake from Clogging



Handy Support for Holding Heavy Tires against Buffing Wheel Eliminates Unnecessary Work

Support for Buffing Heavy Tires

In vulcanizing shops where many large heavy tires are repaired, the labor of buffing and cleaning the damaged fabric is extremely difficult, as each tire not only must be supported at several different angles against the buffing wheel but must often be held in one position for a considerable length of time. To simplify the task, a Wisconsin repairman devised an adjustable support which accommodates itself instantly to any-size tire. The clamp that holds the tire is made from two short pieces of 2 by 4-in. material, hinged to open one way only, and this is suspended, as shown, from a pulley in the ceiling by means of a counterbalanced rope. In operation, the clamp is drawn down to the floor and the hinged clamp partly closed so that the ends of the legs may be inserted into the tire. When the rope is released, the counterweight draws the clamp upward, opening the hinge so that the tire is held firmly, and may be easily supported at any height desired. Thus the operator is free to direct his entire energy and attention to the buffing and cleaning without undue fatigue.—G. E. Hendrickson, Argyle, Wis.



You Can Make This *PIRATE CHEST*

By Edwin M. Love

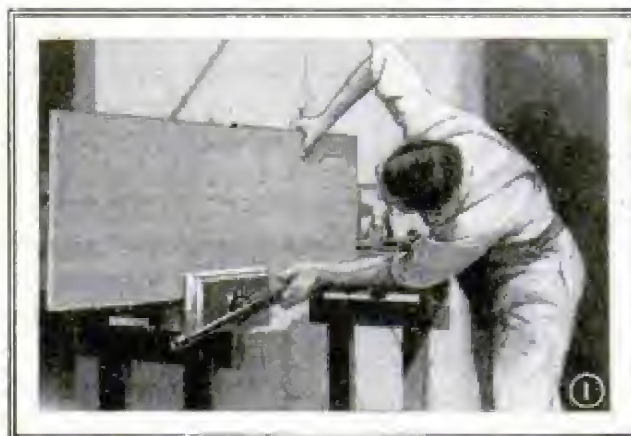
SHIP models on mantels and in wall niches suggest pirate chests as companion pieces—weathered treasure boxes strengthened by well-riveted straps and ornate hinges of iron. Such a chest, today, would cost the purchaser a sum almost rivaling the fortunes guarded by the strongboxes of old, and to make one would tax the ability of an expert. However, with linoleum for “iron,” upholsterers’ tacks for “rivets,” and a few carpenters’ tools, the home mechanic can build a chest in the most approved pirate manner, as a glance at the photographs shows. The materials required are listed at the end of this article. The linoleum may be scraps obtained from the nearest furniture dealer.

Since the corner straps hide the joints, poor joints

in the wood are concealed. The arched top, instead of being formed with well-joined strips, is simplified to four straight boards nailed on with spaces between, into which wedge-shaped strips are glued. It is difficult to get wide enough stock for the parts to be made of a single width, so it is necessary to glue up. From each of the two 10-in. and 8-in. boards cut two 4-ft. lengths and one 2-ft. piece. Group these in pairs of a wide and narrow board, marking crosses on the faces with a pencil to identify the mates and the face sides. The old tradition among workers is to alternate heart and sap sides to provide for warping in opposite directions, that is, toward the sap side, thus preserving a flatter surface, but modern methods of milling and seasoning

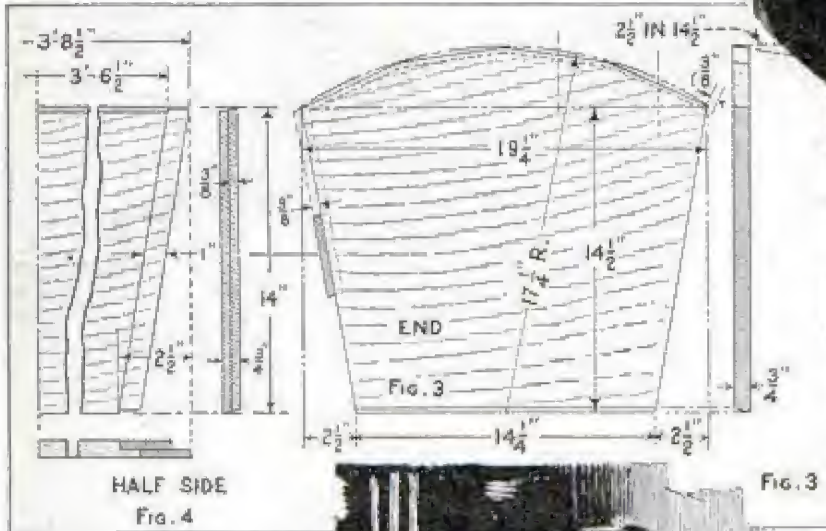
leave an open question as to whether the sap side contains more moisture than the heart. A good rule is to match the better surfaces.

The edges to be glued are jointed straight. They need not be square, provided the bevel on each matches the other, to make a



Jointing the Edges of the Stock for the Sides of the Pirate Chest

flat surface when one board is fitted on the other. Press first one end, as in Fig. 1, and then the other, looking at the far end to detect any opening that would indicate a high spot between. Then take out a "shrinkage shaving" from each, beginning and ending about 3 in. from the ends. The clamps will close the middle, and the extra compression of the ends will



compensate for rapid shrinking of the ends because of ready evaporation from the open pores. Fold the boards together with faces out, and square across both at the center and 6 in. from the ends,



Fig. 2, Squaring across the Ends; Figs. 5 and 6, Cutting the Rabbits on the Endpieces



as in Fig. 2. With a marking gauge set for $\frac{3}{8}$ in., and working from the faces, scratch through each line, centering the $\frac{3}{8}$ -in. dowel holes, which are bored to a depth of $1\frac{1}{4}$ in.

Cut the dowel pins $2\frac{1}{4}$ in. long. The extra length of the holes provides space for surplus glue, which otherwise either would prevent the joint from closing, or would split the boards. Apply glue to all joining surfaces, and clamp up. If using hot glue, warm the wood and work rapidly; but if liquid glue is used, allow it to soak into the wood for two or three minutes, and apply more where

none remains. Many poor joints with liquid glue result from so much glue sinking into the wood that none is left between the pieces to unite them. Two dowels are enough for the endpieces. The stock thus



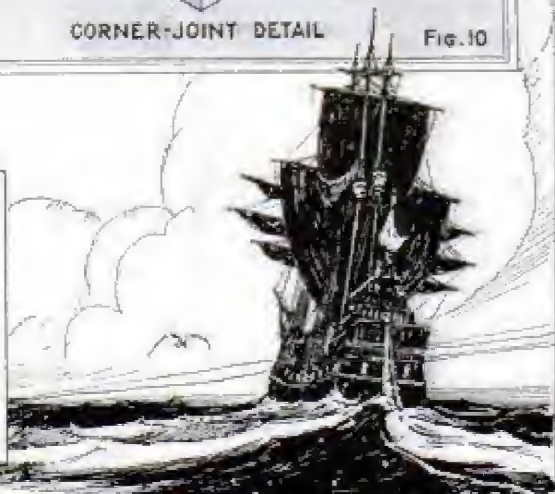
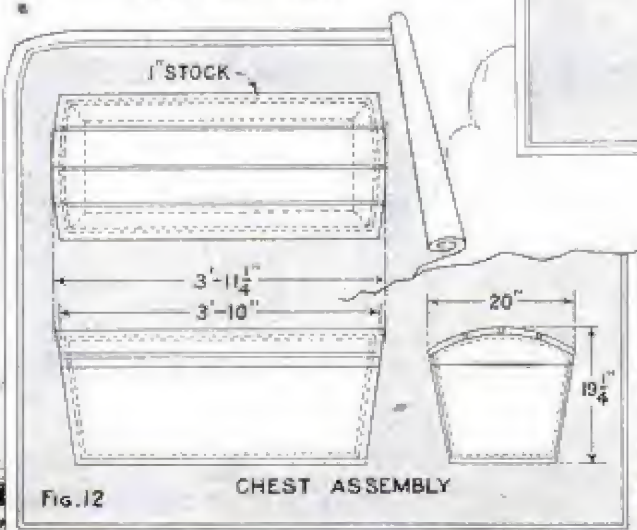
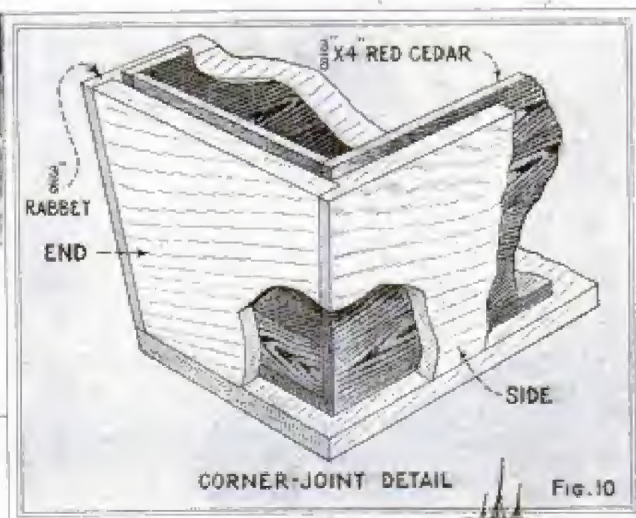
Fig. 7. Marking off Bottom; Fig. 8, Fitting Lining in Ends.



Fig. 9 Starting Cut for Lid; Fig. 10, Detail of the Corner Joint



Fig. 11, Driving the Glued Strips between the Boards Forming the Top of the Chest; Fig. 12, Assembly



obtained is roughly 17 in. in width, so that narrow additional pieces must be glued to the lower edges of them to allow for the curve.

Fig. 3 illustrates an endpiece. Straighten one edge, square a line across the center of the outer face, and from a point $7\frac{1}{8}$ in. to the right, on the lower edge, to a point $15\frac{1}{2}$ in. above and $9\frac{5}{8}$ in. from the center, draw a line. In the same way lay out the other end. Set a bevel square to the obtuse angle indicated and bevel the lower edge to fit. With the base of the center line as a pivot and a radius of 1 ft. $5\frac{1}{4}$ in., describe an arc extending $\frac{3}{8}$ in. beyond each end line, and divide it into four equal parts, across which chords are drawn. Saw out the end, set the bevel for the acute angle, and, holding the handle parallel to the center line for tests, bevel the chords toward the inner face. Trace the other

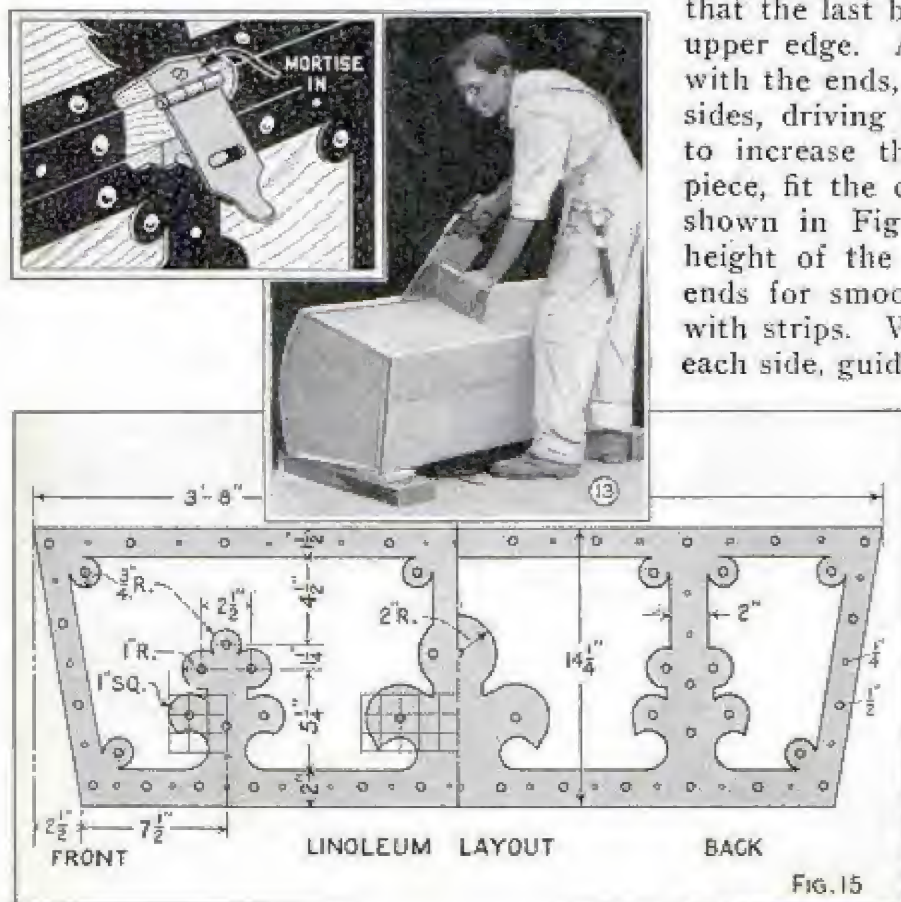
width by comparison with the endpieces. On the inner face gauge lines 1 in. from the ends, and on the ends, $\frac{3}{8}$ in. from the outer faces. Saw the shoulders of the rabbets, guiding by a strip of wood tacked along the mark, as in Fig. 5. Remove the waste and trim to depth with a chisel, as shown in Fig. 6. Lay out the second piece from the first.

Tack the ends to the sides, and set them on the bottom. Square, and trace around the inside with a pencil, as in Fig. 7. Guiding on this line, nail on the cedar bottom lining, toenailing through the tongue every 6 or 8 in. with four-penny finish nails, sloped enough to prevent the points from coming through the bottom. Then scrape and sandpaper the lining.

Line the sides with cedar, cutting the ends flush with the rabbets. Start $\frac{3}{8}$ in. from the bottom with a strip of such width that the last board will be 2 in. from the upper edge. Again assemble temporarily with the ends, and nail the bottom to the sides, driving the nails at various angles to increase their grip. Then, piece by piece, fit the cedar strips in the ends, as shown in Fig. 8, bringing them to the height of the side linings. Remove the ends for smoothing, and brace the sides with strips. With a rip saw cut 6 in. into each side, guiding on a line parallel to the bottom and located at a distance of 1 in. below the upper corners of the endpieces. (See Fig. 9.)

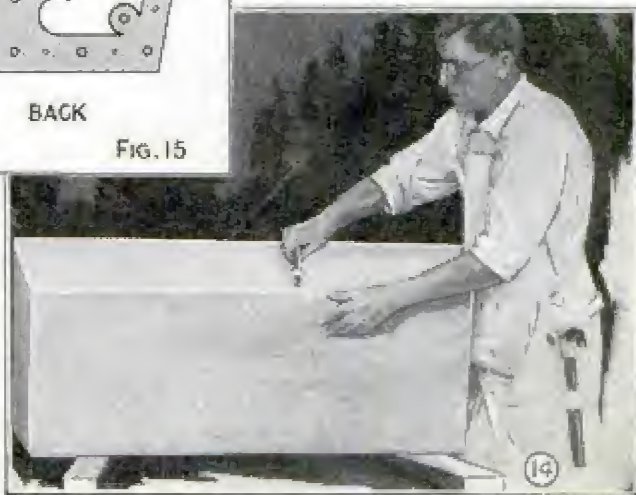
Nail the chest together with eight-penny finish

Fig. 13, Ripping Off the Lid;
Fig. 14, Scratch-Brushing the
Wood before Putting On the
Linoleum "Ironwork"



end from the first. If the upper edges are not alike, when the lid is sawed off the box, the top boards will be sure to twist it out of shape.

The sidepieces are beveled on the lower edges and cut to a length of 3 ft. $8\frac{1}{2}$ in. on the upper edge, the ends, of course, sloping. (See Fig. 4.) Obtain the exact

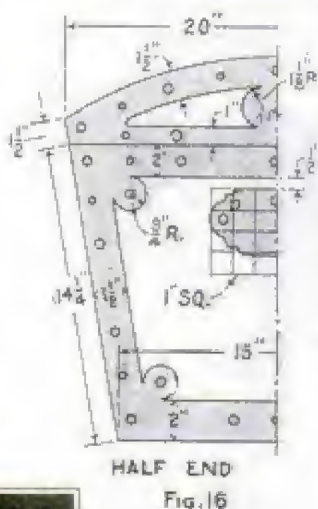
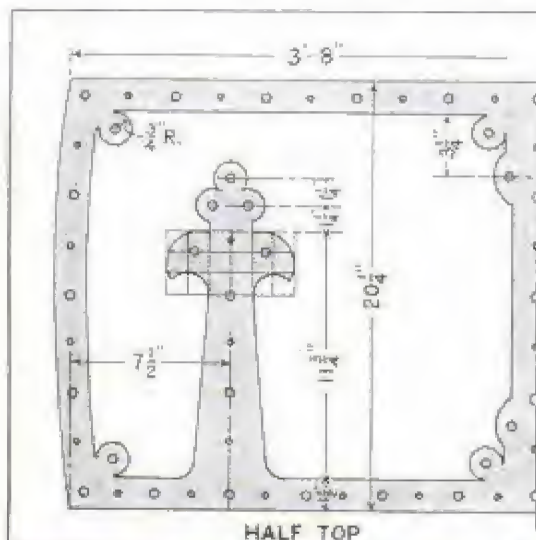


nails driven at various angles through both sides of the corners, while clamped together, forming the joint illustrated in Fig. 10. Bevel the upper edges of the sides, and nail on the four previously jointed pieces of 1 by 6 in. stock, that form the top, slanting the nails so that they will not interfere with the cutting off of the lid. Make three wedge-shaped strips, coat with glue and drive them into the cracks, as in Fig. 11. When dry, round off the surface to fit a cardboard template of a radius of 1 ft. 5 $\frac{3}{4}$ in. Trim the projecting ends of top and side, completing the assembly as indicated in Fig. 12.

Finish sawing off the top, using a guide



Fig. 17, "Peening" the Linoleum; Fig. 18, Mortising for the Hinges; Fig. 19, Staining the Finished Chest



block, if necessary, to insure the correct angle, as in Fig. 13. Joint the edges smooth, and mark the back edge. Line the top with cedar, gluing it as well as nailing.

With a wire brush, scrub the box lengthwise of the grain, as in Fig. 14, leaving a 1 $\frac{1}{4}$ -in. border around the edges, until the soft wood is scratched out, leaving the hard grain in low relief. Mortise in the hasp and staple, as indicated above, Fig. 13, wedging the staple solid if it is of the loose type.

Lay a piece of plain inlaid linoleum over the lock side, tack it down, and trim the edges with a saw. Draw a border line 1 $\frac{1}{2}$ in. from the edge at the top and ends, and 2 in.

at the bottom. In each corner scribe a circle of $\frac{3}{4}$ -in. radius, the edge being $\frac{1}{8}$ in. from the border, and joined to it with a curve. The lock-plate strap is 2 $\frac{1}{2}$ in. wide, with 1 $\frac{1}{2}$ -in. circles in the upper corners. Centering on the strap, 6 in. from the lower border, draw arcs of 2-in. radius terminating in the strap edges, and draw the leaf-forms below from a paper pattern developed from 1-in. squares, as shown in Fig. 15. The two side ornaments are based on straps 2 $\frac{1}{2}$ in. wide, centered 7 $\frac{1}{2}$ in. from the ends of the bottom, finished at the top by a circle of $\frac{3}{4}$ -in. radius, centered 6 $\frac{1}{2}$ in. above the low border, with curves of 1-in. radius 1 $\frac{1}{4}$ in. below, centered on the edges, and leaves drawn as for the center.

The back linoleum, when cut to size, can be laid out almost entirely by tracing from the front piece. The center strap, instead of reaching to the top, finishes with the 2-in. circle, while the hinge straps go to the top, as shown in Fig. 15. Trace the outlines on the box and paint on glue. Apply glue to the linoleum, and nail in place with $\frac{3}{4}$ -in. brads driven every 1 $\frac{1}{2}$ in., $\frac{1}{4}$ in. from the edges. Set them all in. The end and lid patterns are easily ob-

tained in the same way as the others, from Fig. 16. The ends lap past the sides, and the top past sides and ends. Place the handle plates $\frac{1}{2}$ in. below the upper strap of the box ends.

Surface the linoleum with a $\frac{1}{2}$ -in. gouge, as shown in Fig. 17, to imitate the hammer marks of the iron. Drive in the "rivets," centering on the straps and spacing them as evenly as possible. First drive the $\frac{1}{2}$ -in. tacks, and then the others. Put the lid in place, and, $1\frac{3}{4}$ in. from the center of each hinge strap, mark lid and box together at the joint with a knife

point. Remove the lid, take the hinges apart, and use one-half to mark the mortises. Make crosscuts with a chisel, Fig. 18, before trimming to depth.

Stain the wood fairly dark oak, applying with a brush, and wiping off the surplus with a cloth. Since the stain will not "take" over glue, any squeezed from under the linoleum must be removed. Paint the linoleum with lampblack, as it comes from the can, mixed with a little litharge to hasten drying. A coat of boiled linseed oil on the wood completes the finish. Last, attach the handles and the lid chain.

MATERIAL LIST

2 pieces, 1 by 10 in. by 10 ft., fir, S4S, vertical-grained, if possible.
2 pieces, 1 by 8 in. by 10 ft., fir, S4S.
2 pieces, 1 by 6 in. by 8 ft., fir, S4S.
28 sq. ft. $\frac{3}{4}$ by 4-in. red-cedar lining.
15 doz. upholsterers' tacks, $\frac{1}{2}$ -in. heads.
200 upholsterers' tacks, $\frac{1}{4}$ -in. heads.
1 iron hasp and padlock.

1 pair heavy iron chest handles.
1 pair 2 by $2\frac{1}{2}$ -in. loose-pin butts.
1 lid chain.
2 lb. $\frac{3}{4}$ -in. brads.
1 lb. 1-in. brads.
 $\frac{1}{2}$ lb. each of six-penny and eight-penny finish nails.
 $1\frac{1}{2}$ pt. liquid glue.
Small can each of lampblack and oak oil stain.

Linoleum enough to cover the chest.

Cleaning Rubberized Garments

Rubberized garments cannot be cleaned with gasoline or dry cleaning, as the cemented seams will loosen. When cuffs and collars of such garments become soiled, they should be sponged with a solution of water, ammonia and baking soda in the following proportions: one glass of water, one level teaspoonful of baking soda and one tablespoonful of household ammonia. This will clean and brighten the rubber without injuring it.

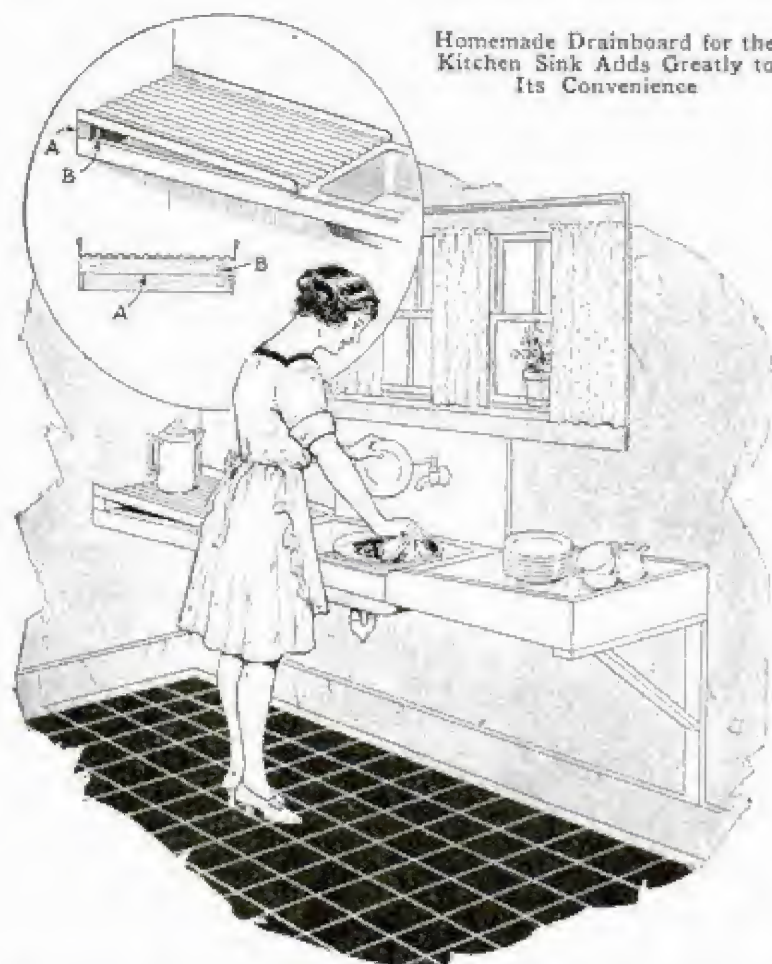
Silo Chute Facilitates Feeding

To facilitate feeding his cattle from the silo, one farmer built the chute shown in the photo. The feeding trough was placed directly underneath the chute, and when it is desired to feed the cattle, it is only necessary to toss the silage into the chute. A ladder is arranged inside of the chute to enable the worker to climb into the silo and a trapdoor is provided to close the chute at the point

where the spout is located, so that all silage will be diverted through the spout and will drop into the feeding trough. The trapdoor is hinged so that the worker can push it up when climbing up or down the chute, and locks in a vertical position.



The Wooden Chute on the Silo Conveys the Ensilage into the Feeding Trough Below



Homemade Drainboard for the Kitchen Sink Adds Greatly to Its Convenience

Homemade Drainboard for Kitchen Sink

In most small houses in outlying districts, the plumbing usually consists of the mere essentials. This applies particularly to the kitchen sink, which will be found against the wall, bare of any refinements. A housewife who is familiar with the fittings in a well-equipped kitchen will appreciate drainboards. A simple method of constructing these is as follows: A frame of light wood is made around the sink, the size, of course, depending on the dimensions of the sink and the desired length of the draining surface. Strips of 1 by 2-in. wood are used to make this frame. Each drainboard is cut from a sheet of corrugated-iron roofing, a sheet having the smallest size corrugations being most practical for this purpose. The sheet is bent up about an inch on each side and the edges are hammered over to make a bead. Next, strips of wood are nailed to the ends farthest from the sink to raise the board and give the necessary slope. A slope of one inch to the foot, or even less, is sufficient. Strips of wood are nailed to the blocks on the main supporting

brackets, with edges projecting upward. This is to prevent the drainboards from sliding forward into the sink. The piece of roofing will be found very rigid and, although only supported at each end, will take considerable weight. However, if the board is more than 2 ft. long, it may be advisable to provide an extra support. A neat finish is given to the whole job by nailing a light board to the front of the frame, as shown at the right in the drawing. This will also support the front edge of the iron. There is no need to fasten the drainboards in any way. In fact, it is an advantage to leave them free so they can be lifted off at any time for cleaning or other purposes.—Stanton Chapman, Se-wanee, Tenn.

Handling Gold-Leaf Sign Letters

Handling and applying small gold-leaf sign letters is a somewhat difficult and tedious task.

However, the use of a dentists' air syringe will be found to eliminate much of the trouble. This is fitted at the nozzle end with a short length of small rubber tubing, as shown in the illustration. The air is forced out of the syringe and the nozzle pressed against the piece of gold leaf,



Holding Gold-Leaf Letters with a Small Air Syringe

which is to be applied to the sign; the bulb is then slightly released so that the leaf is held and lifted by means of the vacuum created in the nozzle. Any small letter or decorative piece may be safely handled in this manner.—G. E. Hendrickson, Argyle, Wis.

Polarity of D. C. Electric Wires

The polarity of wires can be determined by placing the ends of the wires in a common white potato cut in halves. The wires should be stuck in a small distance apart, the distance depending on the voltage. The positive wire of a direct current will turn the potato green and the negative side will remain uncolored. This method can be used in finding the polarities of current from one dry cell up to 500 volts, the only difference being that with very low voltages the wires should be stuck in the potato closer together than with higher voltages. In the case of 110-volt lines, the time necessary to determine the polarity is about 10 seconds, and with a current of, say, 2 volts and upward to 10 volts, it will require about one minute. If electrical workers carry a potato in their tool bag, they will always have a reliable polarity indicator.—Geo. H. Davie, Erie, Pa.

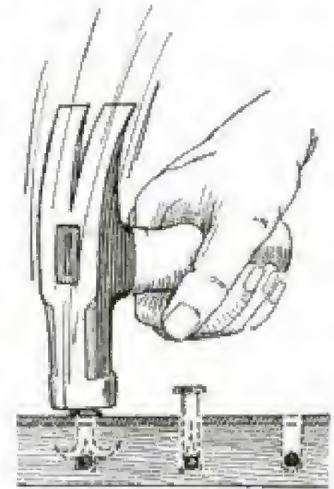
Clothespin Makes Marking Gauge

A clothespin can quickly be made into a very practical marking gauge for running a straight line parallel to the edge of a board, as shown below. One leg of the pin is cut off squarely and a nick made in the edge of the other leg to catch the point of the pencil at the desired distance from the edge. This method will be found handy when the regular gauge is not at hand, and, in fact, the pin can be used in many places where the regular tool is too large for convenient use.—Frank W. Bentley, Jr., Missouri Valley, Iowa.

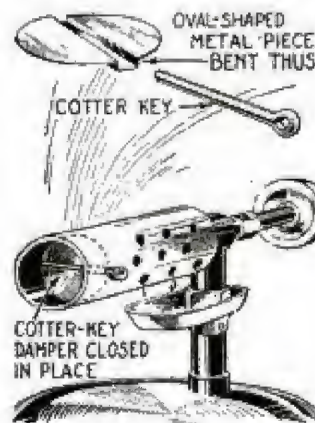


Clinching Split Rivets

I was trying to fasten the hinges and locks on a case with split rivets, and as these were not long enough to clinch they would pull out. To overcome the trouble, I drilled the holes about halfway through the board and dropped a single No. BB shot in the hole. When the rivet was driven against it, the points were spread into the wood as shown, and the rivets did not come loose.—Robert A. Fansher, Cambridge City, Ind.



Damper in Blowtorch Aids in Lighting



When starting a blowtorch, the stream of gasoline from the jet must be regulated very carefully to prevent it from spraying wastefully out of the nozzle. For this purpose, a Wisconsin tin-smith devised a simple damper from a piece of sheet metal and a cotter key. The metal disk was cut oval and bent, as indicated in the drawing, to fit within the mouth of the torch. Holes were drilled to permit the insertion of a cotter pin, which held the damper, the outer ends of the key being spread to hold the damper firmly in place. When desired to pre-heat the torch, the loop of the key is turned with a pair of pliers to close the damper. After the generating pan has filled with gasoline, the damper may be opened so that it will not interfere with the flame. In cold weather, when the torch operates sullenly, the damper may be partly closed so that the flame will transfer more heat to the generating system and thus bring aid in generating gas.

Quick Method of Turning Empty Cement Sacks Inside Out over a Section of Eight-Inch Tile



Using Tile to Turn Cement Sacks

Before empty cement sacks may be returned to the dealer for credit, the contractor must see that they are turned inside out to show that no crust or lumps of cement are left clinging to them to damage the fabric. This is usually a slow and disagreeable task, but one Wisconsin builder simplified the process by the use of an ordinary 8-in. tile. The tile is set on end beside the pile of sacks and the workman performs the labor by lowering each sack into the tile as shown in detail 1, opening the end of the sack as shown at 2 and giving a downward pull. The movement turns the sack in a fraction of a second, leaving it inverted over the tile.—G. E. Hendrickson, Argyle, Wis.

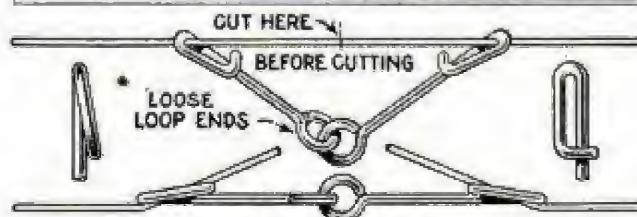
Thread-Cutting Dies

Thread-cutting dies cannot be expected to cut cleanly and well without rake. This rake or lack of it makes quite a difference between a cutting die and one that only scrapes the metal off. The cutting edge of each "land" of the die should be made an acute angle with a line passing through the center of the work and through the extreme point of the cutting edge. Avoid

dies that cut both ways. Such dies do not cut cleanly or easily when either face is to the work, and they must of necessity drag the idle cutting edges over the work and dull them. A set of bolt dies that had the cutting edges parallel to the center line, or rather if continued would form the center line, never cut so well as might have been expected. They were ground out so that the cutting edge had rake, and after that they always cut nicely.

Device Holds Ends of Cut Wires

If a suspended wire is not held securely before cutting it, the ends will drop and whip around in a most dangerous manner. Guy wires are often used on experimental work or temporary constructions, and when the need is ended, it is usual to cut all wires to hasten dismantling operations. A wrecking contractor engaged in tearing down an exhibition building, constructed a little device for holding the cut ends of flag, guy and all other wires, which, if allowed to drop, might injure workmen. The device is made of two short lengths of heavy wire looped at one end into each other, the other ends being bent, as shown, to slip over the wires to be cut. The important feature of these bends is that they must be a spring fit on the wire. Before cutting a wire the gripper is snapped over it on each side of where the cut is to be made. When the wire is cut, the weight of it pulls the gripper out straight and it tightens as shown in the photo, the sudden jerk bending up the cut ends, which are then held securely. To bring the long end of the wire safely to the ground the



Simple Device for Holding the Cut Ends of Wires under Tension

gripper is pulled at one end and the short end of the wire removed.

A Homemade Apple Wiper

By H. R. MERRILL

WHEN the edict was issued from the U. S. department of agriculture that all Utah apples must be wiped before they were placed on the market, a loud wail went up from the fruit growers of the

the same direction, by a $\frac{1}{8}$ -hp. motor. While the rollers run in the same direction, one is driven a little faster than the other, due to the difference in the number of teeth on the sprockets. At the top of the frame was mounted a feed chute for the apples, and a heavy cloth top was fastened to a frame



Above, Packing the Wiped Apples, Using the Cone; Right, the Homemade Wiper in Operation



state. Brigham Young university, one of the largest private institutions in the west, found itself with an apple crop of 4,000 bu., on a piece of ground that had been bought as an addition to the campus, and the problem of wiping them at first seemed a hopeless one.

It happened that the custodian of one of the buildings was a real handy man, and had shown his ingenuity in the past by constructing such devices as a feeder for his stoker, a bell ringer for the school clock and an automatic sprinkling device which turned the water for the grounds on and off at the required times, and, in this emergency, he was set to work on the problem. The machine he evolved is shown in the accompanying illustrations.

He first obtained two sprocket wheels from the bicycle shop, fastened them to the ends of two rollers, about 3 ft. long, covered the rollers first with padding, and then with sheepskin, wool-side out. These were mounted in a wooden frame, with the sprocket ends elevated, and driven, in

over the rollers, the cloth being left loose enough to sag down on the apples, as they passed along the rollers, and thus do a share of the wiping. Since a commercial machine had later been introduced in which a fan was incorporated, the constructor of this machine, Mr. J. W. Sauls, obtained a blower similar to those used on blacksmiths' forges, and mounted this in a box under the rollers, in such a manner that a constant current of air was driven over the apples. This completed the machine, which met with the entire approval of the inspector.

The machine worked successfully for the entire crop of apples, handling an average of 1 bu. a minute. In fact, the

wiper was fast enough to keep the packers busy every minute.

The upper picture shows the method used to pack the apples in round bushel baskets, in such a manner as to have the top layer in perfect concentric circles. The apples are first placed in a sheet-metal

cone, constructed to hold a bushel, the first layer being carefully laid by hand, and the remainder of the bushel poured in. A basket is then placed over the packing cone, bottom side up, the whole inverted and the cone removed, leaving the top layer in perfect order.

Drawer Chest for Tools on Truck

After he had frequently forgotten some of his tools and material, a plumber built



Plumber's Handy Tool Chest and Workbench Fitted at the Back of His Car

a large drawer chest on the back of his car. The sides of the chest was hinged and could be dropped down to form a sort of workbench, as shown in the illustration. Besides being handy to work at, this improvised bench eliminated much of the usual mess on customers' premises, and therefore quickly won the approval of his customers.

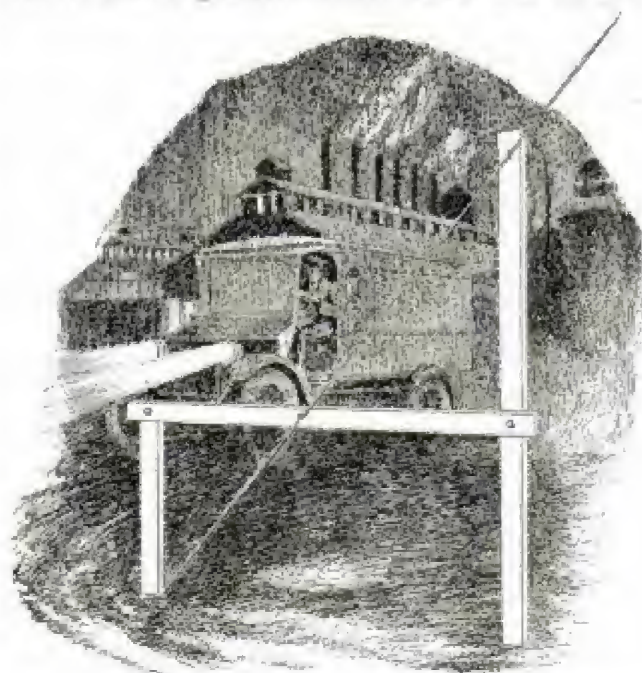
Nickel and Silverplating by Friction

To nickelplate iron by friction, a thin coating of copper is first produced on it by rubbing on a solution of 20 parts sulphate of copper, 5 parts sulphuric acid and 100 parts of water. After the copper coating has been formed, rub over it, with a rag, a solution of 3 parts tin, 6 parts nickel and 1 part iron in 100 parts of hydrochloric acid and 3 parts of sulphuric acid. If finally the object is rubbed with a rag that has been dipped in finely pulverized zinc, a nickel deposit will be formed on the copper. The thickness of the deposit of

nickel can be increased by repeating the two last operations. A silver coating can be produced by dissolving freshly precipitated chloride of silver in a solution of hyposulphite of soda, 1.1 parts to 10 parts of water, and adding to this solution 180 parts of spirits of sal ammoniac and then stirring in 800 parts of finely washed chalk. This mixture is applied and rubbed until it dries on the object.

Rail Prevents Accidents from Guy Wires

In a factory yard where a number of guy wires are anchored to support several high steel smoke stacks, many accidents resulted when workers stumbled over the wires, or loaded trucks and wagons were driven beneath them. To avoid this trouble in a cheap and effective manner, the superintendent ordered frames of wood erected at each anchor as shown, the highest post being set at a point which would direct the highest-loaded truck out of the

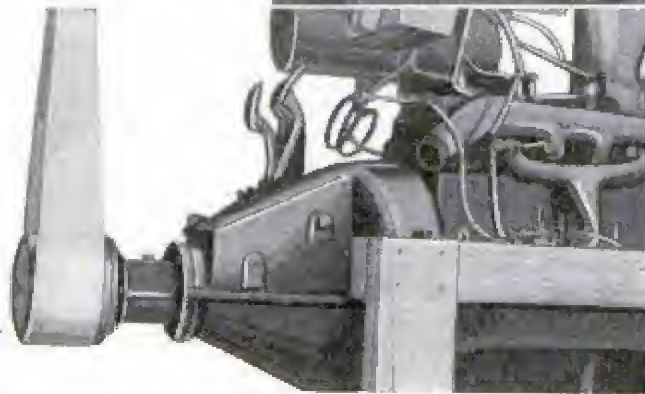
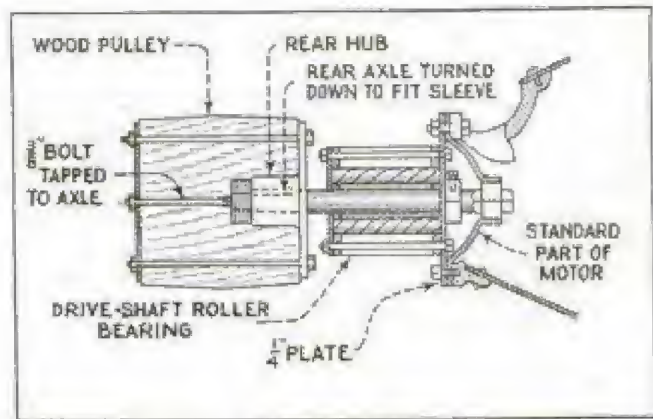


Wooden Frames on Guy-Wire Anchors Effectively Prevent Accidents

danger zone. The frames were painted white to insure visibility at night.

Ford Engine Used as Power Plant

There are thousands of old Ford engines that are still useful for occasional duty to run a workshop power plant, a generator for lighting purposes and the like. One difficulty that the amateur encounters in such an installation is the attachment of a pulley to the shaft. The detail in the upper right-hand corner shows how this can readily be done, and the photo in the lower

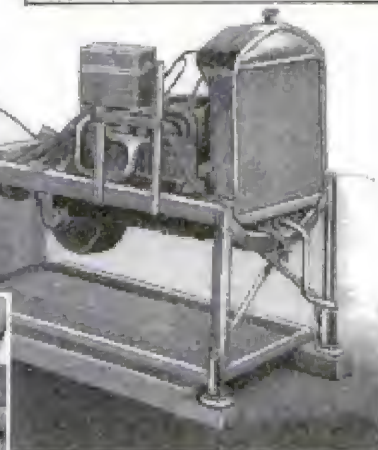


Wooden Pulley, Securely Attached to the End of the Crankshaft, Makes Ford Engine into Power Plant

left-hand corner shows the pulley completely installed. All parts are standard and can be obtained from any Ford dealer. —Geo. C. Plummer, Huntsville, Ohio.

How to Remove Broken Key in Auto Gear Shift

When a key breaks in the gear shift the owner often has to remove the entire lock, and as it is usually riveted in place it is then ruined. A better method of getting the broken end of the key out is to solder a short length of copper wire to it. The storage-battery current can be used for this purpose. The procedure is simple: First tin the end of the wire, about No. 22 or No. 24 gauge, so that there is a small drop of solder adhering to it. Then attach a length of fairly heavy wire, about No. 10 or No. 12 gauge, and preferably stranded, to the other end of the small wire. Apply some flux or soldering salts



to the edge of the broken key. Try not to get any flux on the sides of the slot, for the solder might then stick to them, which is, of course, undesirable. Insert the small wire and while holding the end against the

edge of the key, carefully touch the free end of the heavier wire to the live side of the battery current, the other side being grounded. A touch or two is sufficient, as the small wire immediately gets hot and sticks to the key. —Guy L. Anthony, Honolulu, T. H.

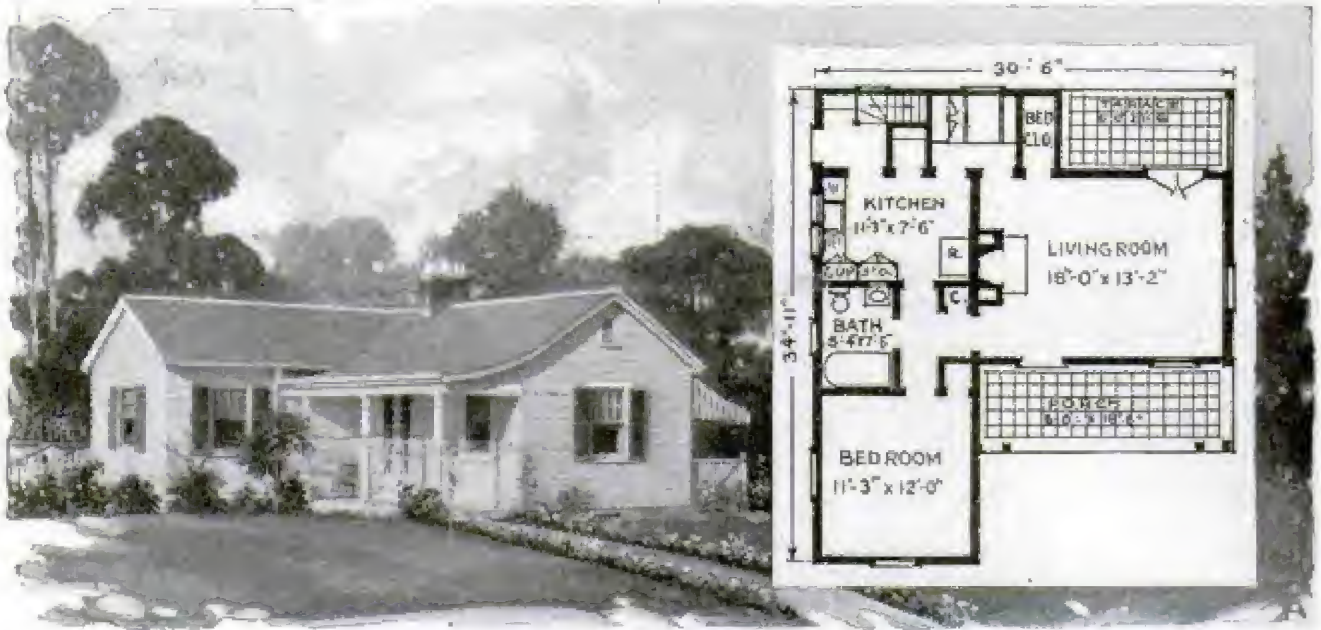
Cabinet for Heating Felloe Bands

In a Denver auto repair shop, felloe bands are heated in a perpendicular cabinet of sheet metal, which saves space and makes the operation much more satisfactory than the usual method of heating them flat on the floor. The cabinet closes up like a kitchen cupboard with two large



doors. Large bolts in the back of the cabinet serve to hold the bands while the 2-in. perforated pipes supply the gas flame.

Is This Your Home?



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Plan No. 3B1

QUESTIONS regarding home building addressed to this magazine will be answered by The Architects' Small House Service Bureau of the United States, Inc., controlled by the American Institute of Architects and endorsed by the United States Department of Commerce. Please inclose 10c in stamps or coin. Blueprints, specification forms, and material lists for the house shown here may be obtained from The Architects' Small House Service Bureau for a small fee. If further information is desired, literature describing the plan service and publications of The Architects' Small House Service Bureau will be sent you upon request. A booklet entitled "50 Ways to Lower Home Building Costs," illustrated by ten Bureau homes actually lived in and showing how as much as \$1,000 can be saved on a home, may be obtained for 20c.

THIS little house presents an opportunity of combining luxury with economy. It is something more than the bare bones of a house, for it is cram full of the kind of things home builders want. It has a fine plan and fine exterior, because it was arranged by a group of architects who knew how to make use of ordinary materials and forms so as to get the most out of them.

People are beginning to see more and more the futility of wanting large houses and to realize that nearly everything they want can be had, anyway, in the smaller house. This is well worth thinking about. Why do people build six rooms when they need only three? Take this plan as an example of what can be done with three rooms. By the inclusion of space for a closet bed and a dining alcove there is living accommodation here for at least three.

The omission of the dining room is a major stroke in effecting economies. For all ordinary purposes the dining alcove serves admirably.

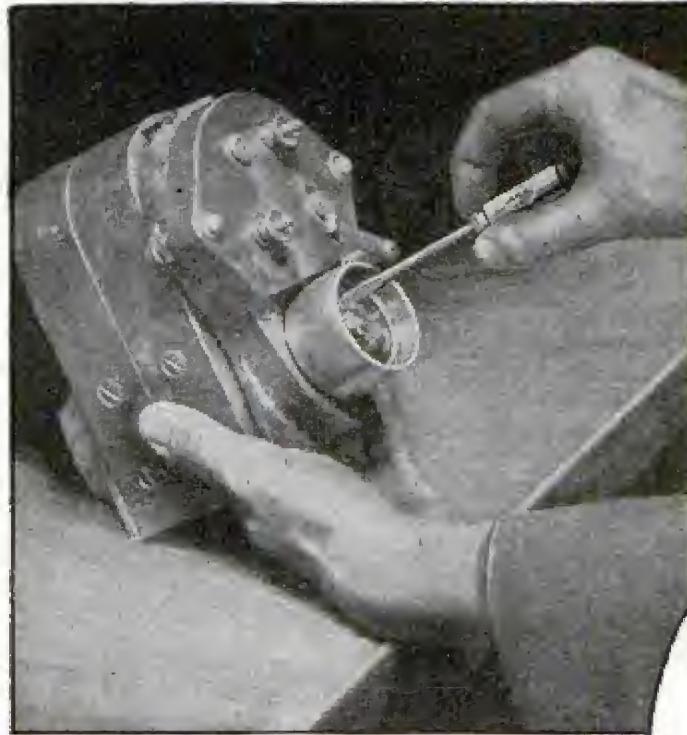
Look over this plan and see the luxuries it affords. The living room is replete with

them. There is a fine fireplace at one end and at the other a window seat. This is flanked on both sides by built-in bookcases. A French door leads to the terrace.

In the dining alcove are arranged built-in seats with hinged tops, a dining table and an attractive china cabinet. The kitchen has broad spaces for working under a strong light. The refrigerator is reached through a door off the rear entry, where also are the stairs that lead to the basement.

The bathroom has a recessed tub and a medicine cabinet. Just opposite the bathroom is a closet for coats or linens. The bedroom is of good size and has a closet arranged where the door will not interfere with the room space, and has windows on two sides. In the basement is a long, well-lighted laundry, a storage pantry, and the usual heater and fuel rooms.

Construction: Wood frame, exterior finish, siding, roof of shingles. Lot size: About a forty-foot lot is required. Facing: The house should be faced west or north, or it may be built reversed.



While left hand holds work, and right hand holds driver steady, you start screw with thumb-turn on blade.



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Eight sizes: 2 to 12-inch blades.

No. 11 — Same as No. 10, except ratchet shifter moves across tool.

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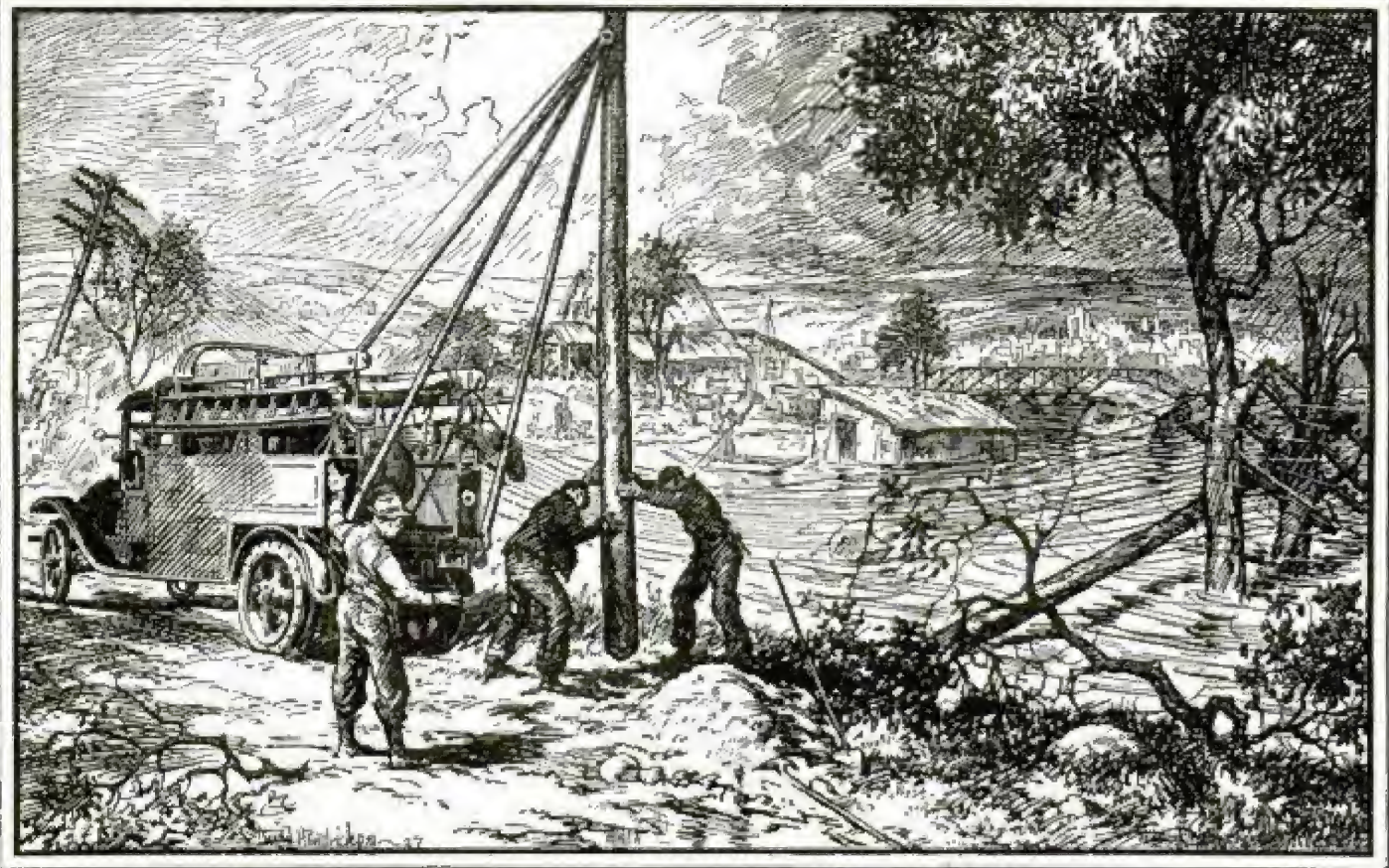
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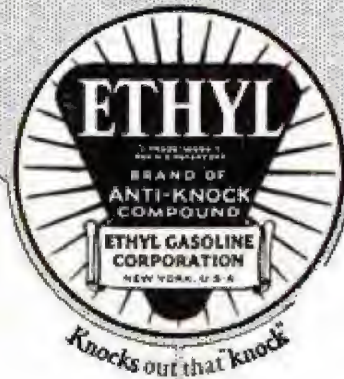
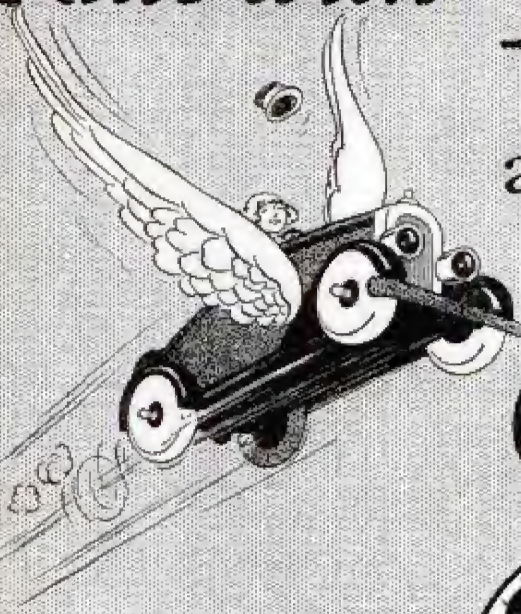
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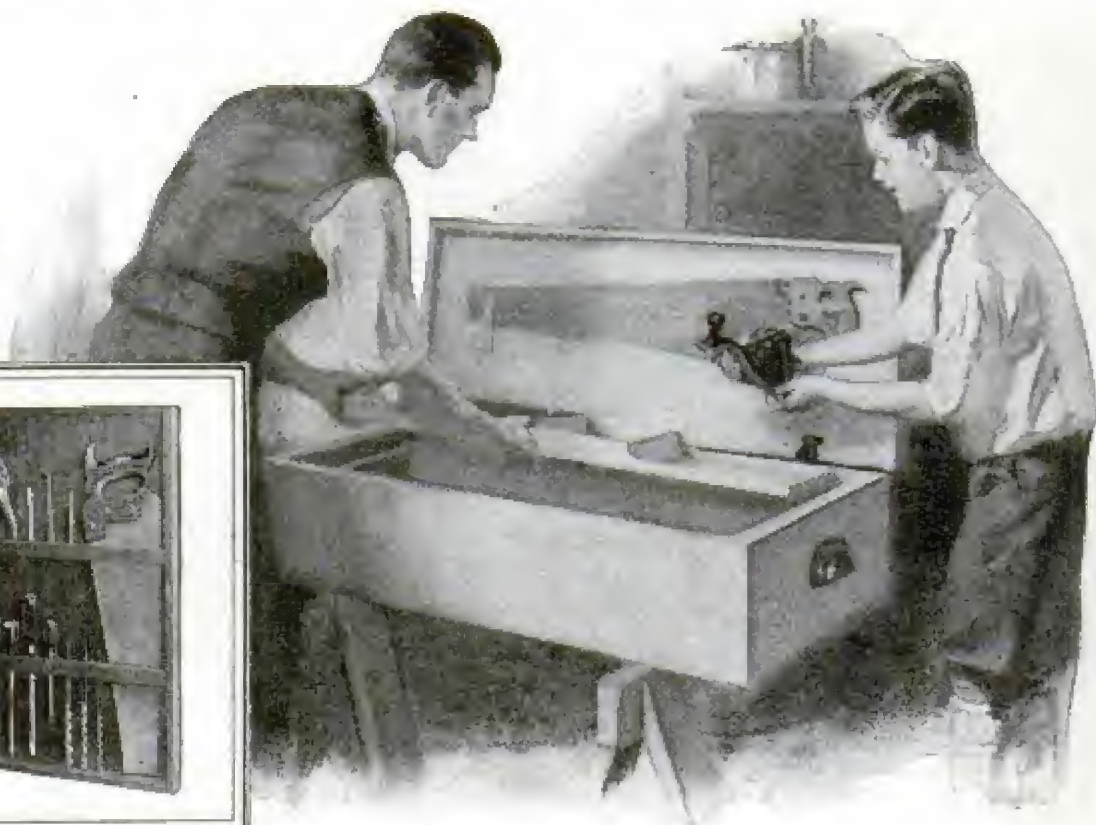
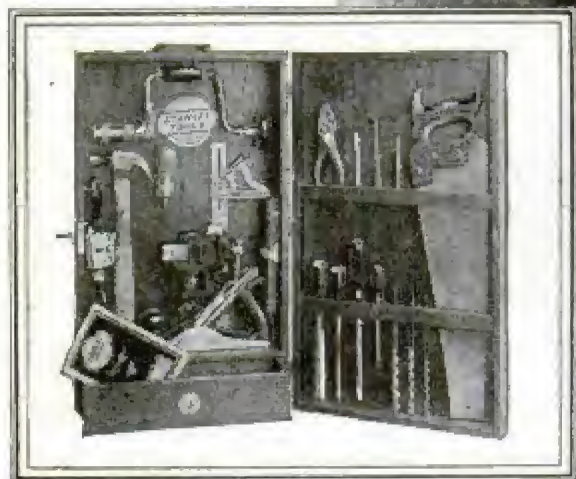
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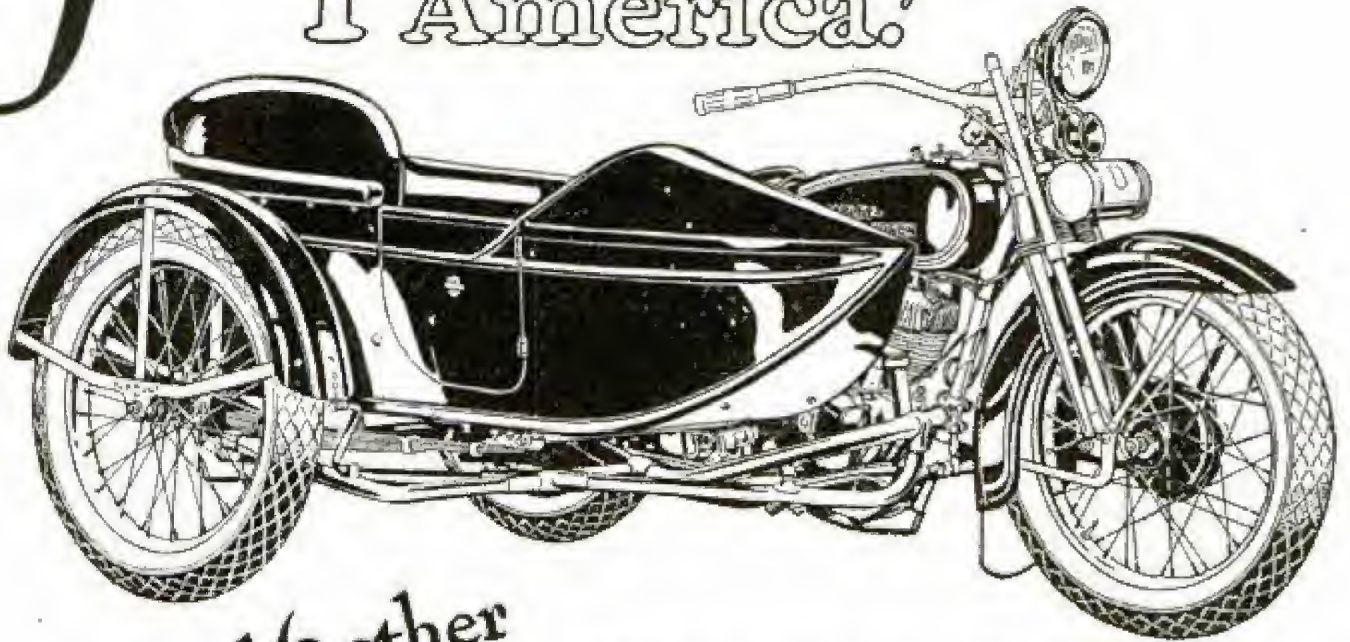
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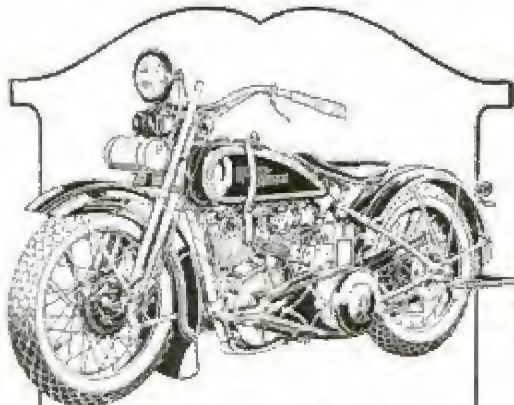
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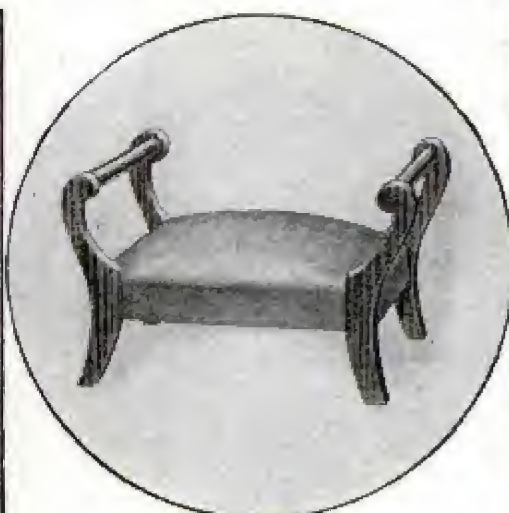
Geo Hannah



Use Starrett Tools



HANGING BOOK SHELVES
See LePage's Book, page 25.



FOOT STOOL
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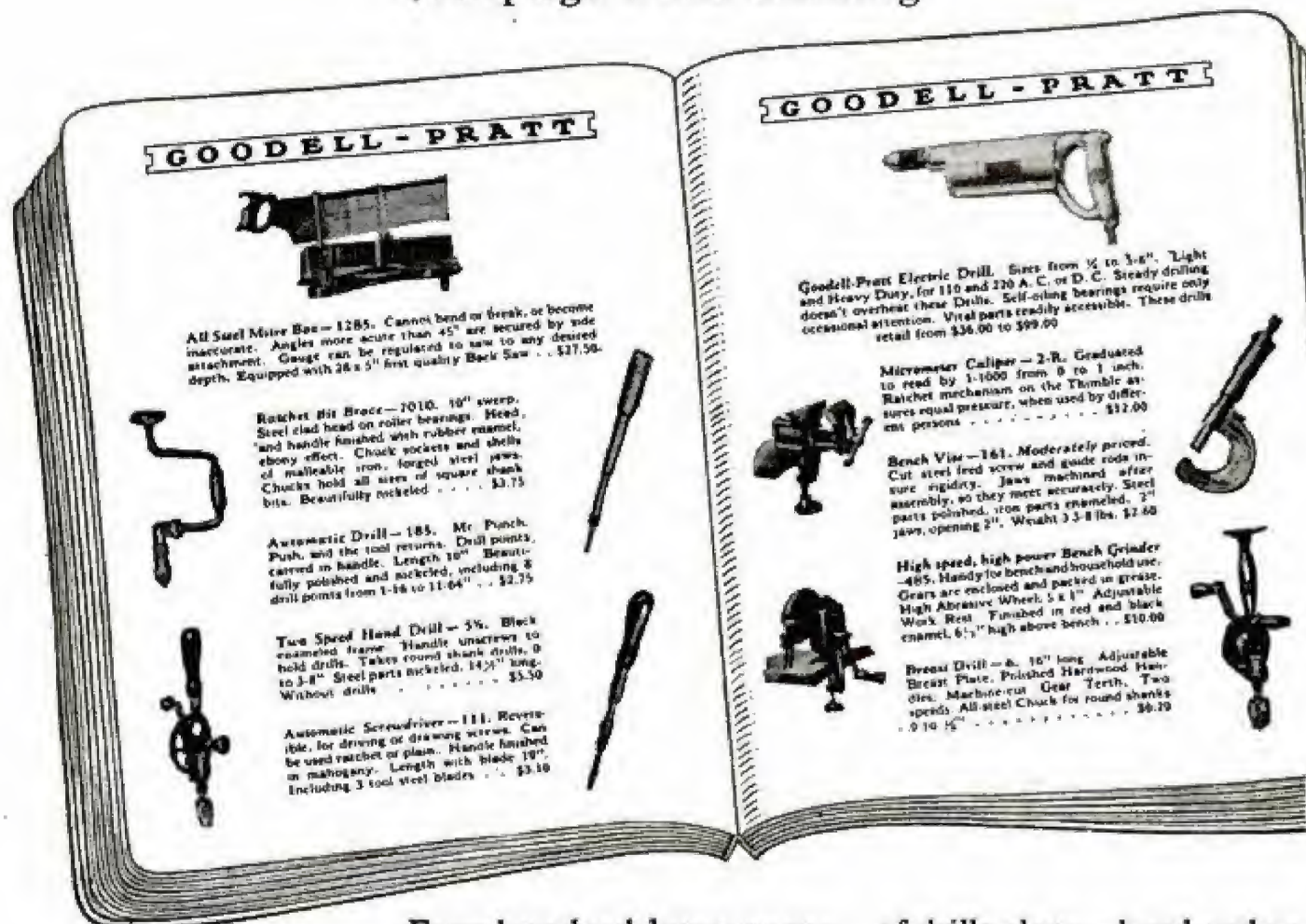
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Three Year Guarantee

Metrodyne Super-Seven Radio

A single dial control, 7 tube, tuned radio frequency set. Tested and approved by Popular Science Institute of Standards, Popular Radio Laboratory, Radio News Laboratory and by America's leading Radio Engineers. Designed and built by radio experts. Only the highest quality low loss parts are used. Magnificent, two-tone walnut cabinet with beautiful, gilt metal trimmings. Very newest 1928 model.

Easiest set to operate. Only one small knob tunes in all stations. The dial is electrically lighted so that you can log stations in the dark. The volume control regulates the reception from a faint whisper to thunderous volume, 1,000 to 3,000 miles on loud speaker! The Metrodyne Super-Seven is a beautiful and efficient receiver, and we are so sure that you will be delighted with it, that we make this liberal 30 days' free trial offer. You to be the judge.

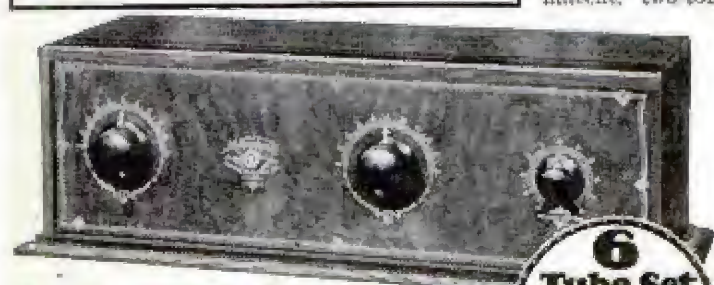
Mail COUPON Below!

Let us send you proof of Metrodyne quality—our 30 days' free trial offer and 3 year guarantee

Mrs. Wm. Leffingwell, Westfield, N. J., writes: "The Metrodyne Radio I bought of you is a wow! This is as good as any \$225 machine I have ever seen." N. M. Greene, Maywood, Ill., writes: "My time is up and the Metrodyne works fine. I got Havana, Cuba, Oakland, Calif., Denver, Colo., Toronto, Canada, all on the loud speaker."

J. W. Woods, Leadville, Colo., writes: "Received the 7-tube Metrodyne in fine condition. Had it up and working same day received. Was soon listening to Los Angeles, San Diego, Oakland and other California points; also St. Louis, Kansas City and other east and south stations—all coming in fine. Am more than pleased. Sure enjoying it."

We will send you hundreds of similar letters from owners who acclaim the Metrodyne as the greatest radio set in the world. A postal, letter or coupon brings complete information, testimonials, wholesale prices and our liberal 30 days' free trial offer.



30 Days' Free Trial—3 Year Guarantee

Metrodyne Super-Six

New 1928 model Metrodyne 6 tube, two dial, long distance tuned radio frequency receiver. Approved by leading radio engineers. Highest grade low loss parts, completely assembled in a beautiful walnut cabinet. Easy to operate. Dials easily logged. Tune in your favorite station on same dial readings every time—no guessing.

Mr. Howard, of Chicago, said: "While five Chicago broadcasting stations were on the air I tuned in seventeen out-of-town stations, including New York and San Francisco, on loud speaker, loud and clear."

We are one of the pioneers of radio. The success of Metrodyne sets is due to our liberal 30 days' free trial offer, which gives you the opportunity of trying before buying. Thousands of Metrodynes have been bought on our liberal free trial basis.

**6
Tube Set
\$48⁵⁰**

RETAIL PRICE
Completely
Assembled

MAIL THIS COUPON

or send a postal
or letter. Get our
proposition be-
fore buying a ra-
dio. Deal direct
with manu-
facturer—SAVE
MONEY—WRITE
NOW!

METRO ELECTRIC COMPANY

2161-71 N. California Ave., Dept. 39, Chicago, Ill.

Gentlemen:

Send me full particulars about Metrodyne 6 tube and 7 tube sets and your 30 days' free trial offer.

Name.....

Address.....

If you are interested in AGENT'S prop-
osition, place an "X" in the square ☐

METRO ELECTRIC COMPANY

2161-71 N. California Ave., Dept. 39, Chicago, Illinois

for Precision Construction Mechanics use BROWN & SHARPE TOOLS

The moderate priced motor car could not roll on the roads today were it not for the precision tools which make quantity production possible.

Precision construction plays just as important a part throughout hundreds of industries as it does in the manufacture of automobiles.

Mechanics in all of these industries place complete reliance in the performance of Brown & Sharpe Tools. They know that this performance sets a standard of accuracy throughout the mechanical world.



B.S

Hardware dealers can supply you with catalog No. 30 or, we will send you one direct.

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BROWN & SHARPE TOOLS

"World's Standard of Accuracy"

What Do You Want?

Think of the things you would have if you only had the money—a new car, the best radio, that musical instrument, those new tools, or money to start in for yourself!

Here's the Way to Get It

Cash in on the big demand everywhere for expert saw filing. You can do it with the Foley Automatic Saw Filer. You can turn out better work than expert hand filers, in less than half their time. Carpenters, contractors, woodworking plants, factories and schools will be your regular customers. Steady year around business. As high as \$20.00 a week extra cash. Why not find out how easy it is to have the things you want? No obligation if you write. Address—

Foley Saw Tool Co., 219 Foley Bldg., 9 Main St. N.E., Minneapolis, Minn.



21 JEWEL ~ Extra Thin STUDEBAKER The Insured Watch

Sold Direct
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You save 30% to 50%

An amazing offer! Just \$1.00 down brings you the famous 21-Jewel Studebaker Watch direct from factory. Balance in easy monthly payments. Lowest prices ever named for equal quality. By buying direct you save 30% to 50%. Your choice of 80 magnificent, new Art Beauty cases and dials. Latest designs in yellow, green and white gold effects. Exquisite thin models. 12 Size and 16 Size.

Send coupon for catalog of Advance Watch Styles and full particulars. Studebaker Watches have 21 Jewels, 8 Adjustments—Insured for your lifetime! Insurance Policy FREE! Ladies' Bracelet Watches, Men's Strap Watches, Diamonds and Jewelry also sold at lowest prices and on easy monthly payments. Send coupon for full details.

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The coupon below will bring you a copy of our beautiful new six-color catalog. It contains complete information on watch making. It tells how you can buy a 21-Jewel Studebaker Insured Watch direct from the maker—save big money and pay for it in easy monthly payments.

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For a limited time we are offering a magnificent Watch Chain Free. To all who write immediately we will include particulars of this astounding offer. Offer is limited. Send the coupon NOW!

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☐ Please send me your free catalog of Advance Watch Styles and details of your \$1.00 down offer. ☐ Please send me free catalog of Jewelry and Diamonds.

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Today!





New Model Pocket Ben

Hundreds of thousands of men and boys have put their "O. K." on the New Model Pocket Ben.

Good looks, faithful service and low price—it is everything you need in a watch.

Sold everywhere for \$1.50. With luminous night-and-day dial \$2.25.

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TO DEMONSTRATORS

This is the WASCO Inserted Valve Seat, for all cars. A set may be inserted in a car in from 40 to 60 minutes by our special tool (patent applied for). Has approval of big auto factories and is listed in manufacturers' "approved" shop equipment catalogs.

You can make big money demonstrating to car dealers, garages and service stations. Has instant approval. 3 out of 4 want it. Low in price. Earns big money for dealer. We want several men who can earn \$5,000 a year, clear, and upwards. Write for full information, special proposition and literature. No obligation. State territory wanted.

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RADIO AGENTS Make Big Money

EASY to sell American Radios and Supplies. Nationally advertised, high quality merchandise at wholesale. Big profit on every sale. No capital to invest. No stock to carry. Order direct from my huge warehouse as you sell. Get My Liberal Offer and also Big New 122-page Catalog and Guide—"How to Sell Radios"—Free. Full of Bargains—all latest in Radio. Write today. AMERICAN AUTO & RADIO MFG. CO. HARRY SCHWARTZBERG, PRES. Dept. 266 American Radio Bldg., Kansas City, Mo.



SET BUILDERS!

Before you build get our special prices on the parts you are planning to use. We'll save you money. Largest and most complete stock in U. S. A.

CHICAGO SALVAGE STOCK STORE
Dept. P. M. 509 S. State St., Chicago, Ill.

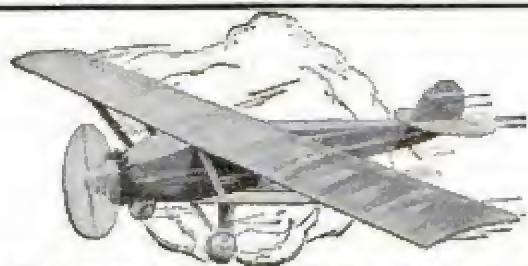
A SHIP MODEL FOR \$4.98



Build an exact replica of the historic Santa Maria or the Mayflower with your own hands. We will furnish the parts cut to fit and ready to assemble complete for only \$4.98 plus a few cents for postage. No tools needed except a small hammer.

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MINIATURE SHIP MODELS
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Build and Fly a 3 ft. Model of LINDBERGH'S NEW YORK-PARIS MONOPLANE

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Airplanes 25c per set.

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(All 9 Plans

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This IDEAL New York-Paris Mono-
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Complete Construction Outfit, **\$7.50**
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Ask your dealer or order direct.
Plans and instructions only (No
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IDEAL AEROPLANE & SUPPLY CO.
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Airplanes, Parts,
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Own a CORONA

The portable typewriter
built like an office ma-
chine. Has four-row key-
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features throughout.
Write to

L. G. Smith and Corona Typewriters, Inc.
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machinery including Band Saws, Rip Saws, Scroll Saws, Jointers
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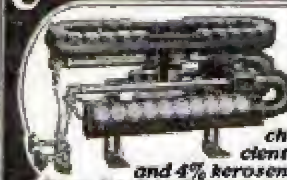
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Our stock of films is the most complete and lowest in
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**Does Away
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Converts any ordinary
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and 4% kerosene. Installed in few minutes.

Types for all heating purposes. Reliable distributor wanted.
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Do us the kindness
to try it

**PALMOLIVE
Shaving
Cream**



GENTLEMEN:

One thousand men were consulted as to what they
sought in a shaving cream. From them we learned
four things in which they said others had failed.

With these as our goal our laboratories started in.
Time after time they failed, only to try again. The
130th formula brought success. Brought, too, a
fifth feature to assure still greater shaving joy.

Now we ask you to try this shaving cream we've
made for you. In simple fairness let us send a 10-
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Our laboratories are competent, superlatively equipped. For
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These 5 advantages

1. Multiplies itself in lather 250 times.
2. Softens the beard in one minute.
3. Maintains its creamy fullness for 10 minutes on the face.
4. Strong bubbles hold the hairs erect for cutting.
5. Fine after-effects due to palm and olive oil content.

Don't buy—yet

Now we ask that for 10 days you shave our way. At our
expense. If we have excelled, you will want to know. If we
have not, you will know that, too. You can't fool men about
shaving.

Do us the courtesy of a 10-day test. Cut out the coupon now.

THE PALMOLIVE-PETT COMPANY,
CHICAGO, ILLINOIS

3730

10 SHAVES FREE

and a can of Palmolive After Shaving Talc

Simply insert your name and address and mail to Dept.
B-1382, Palmolive, 3702 Iron Street, Chicago, Ill.
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(Please print your name and address)



The "Mountie" isn't lonely any more

WHEN the supply ship steams south from the last outpost of northern civilization in September, not to return until the following July, loneliness will never again beset the lives of the Royal Canadian Mounted Police who patrol that vast, wild area. Radio is now brightening the long winter nights with music, special programs, messages and greetings from their "home folks." And in the receiving sets of the "Mounties" is the best equipment obtainable. The batteries they use *must* be dependable. They must serve until new supplies are brought in a year later.

Ask Any Radio Engineer

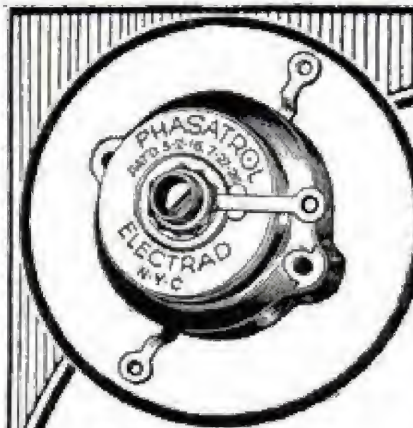
BURGESS BATTERY COMPANY

GENERAL SALES OFFICE: CHICAGO

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BURGESS RADIO BATTERIES



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Forever!**

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A True Balancing Device for All
Radio Frequency Amplifiers

Price \$2.75

Imagine your set without the squeals caused by radio frequency oscillations! You can stop the oscillations and assure perfect, even reception by installing PHASATROLS.

This new Electrad device simplifies tuning and lets distance come in clear. Easily installed in any R. F. set—tuned, untuned or reflex.

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Contains "Hook Ups"
5 Radio
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"Build your own with 'RASCAL' Parts"

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HOT Dollars all Winter

Man—you don't have to sell heat! Everybody wants it. Millions of farm and town homes demanding convenient, cheap GAS heat for cold weather. Here's a 100% EFFICIENT HEATER that will keep the house warm at 23° below zero.



When it's 23 below zero, the EVERBRITE Radiant Oil Heater will keep you comfortable. Mrs. Senften, Genoa, Nebr., writes: "Last Sunday it was 23 below zero, but the Everbrite kept us warm and burned 25 hours on one filling."

EVERBRITE men making \$3000 to \$5000 a season—no high pressure, no soliciting, just visiting prospects and leaving the heater for a night's trial. In the morning call and get your money. No argument—the man who can supply a UNIVERSAL NECESSITY at LOWER COST is the man who piles up the dollars.

Just sold seven Everbrites. They look like a gold mine to me. Secured three extra salesmen and have several more ready to start. Kindly keep the Everbrites rolling in by twos daily by express until large freight shipment can reach me."

Willet Arnquist,
Union City, N. J.

NOW I'm going to smash all sales records—pay more money to representatives—double my

national advertising campaign—HEAT UP THE WHOLE COUNTRY with EVERBrites. If you WANT MONEY write me QUICK.

The EVERBRITE IMPROVED Radiant Oil Heater

Harry M. Washington
President

**\$200 A Week Easy
We're Choosing Men Now**

A portable heater for homes, stores, churches, offices, making and burning its own gas from common kerosene—the greatest household comfort ever offered—and the greatest money making proposition for agents in the world. 10,000 sold last winter—revolutionizing heating in districts where there is no natural gas! Pours out floods of intense, pure, healthy heat without fuss or bother. Looks like a million dollars and lasts forever. Sold at low price. Just the thing for your home—heats a cold room like an August Sun. You can get one now for your own use.

Elegant Nickel trimmed baked enamel finish. Cleaner, cheaper, more comfortable than wood or coal fire. Generates its own heat from common coal oil and combines with 96 per cent air to burn clean and smoke free through lava disc burners and fire clay radiants. No wick. Turn up or down at will, like city gas. Burns 8 to 10 hours on gallon at cost of less than 1 cent an hour. Move from room to room while burning. Will heat whole house or single room. 23 in. high—shipping weight, 40 lbs.

Amazing New Sales Plan

We make the sale by national advertising, furnish you names, and you get the profit. District agents clean up; local agents work for you. Local agents promoted into big money class. Gave one Texas agent 291 leads; Oklahoma man found it a cinch to close 247 names we gave him in his district. Sales manuals and splendid mailing literature furnished. A real business and valuable franchise.

A Hot Proposition

"Send 6 Heaters. Yesterday was the first cool day so I fitted up an Everbrite in a window of a downtown office. It created a great deal of excitement and I booked 5 orders with several prospects." J. E. Downen, Durant, Okla.
"I have already sold 135 Everbrite Heaters. Daily increasing my sales force and dealers and I hope to place a total of 500 before the season closes." J. O. Hand, Sacramento, California.
"Sold 89 stoves here in Tarrant County last year, and expect to more than double that this year." J. D. Bule, Fort Worth, Texas.

Mail me coupon today.

HARRY M. WASHINGTON, Pres.

The EVERBRITE STOVE CO.

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FREE Just send coupon now for amazing agent's offer and full information how to get your own heater and make big money.



Mr. Harry M. Washington, Pres.
Everbrite Stove Company, 3211 Gateway Sta.,
Kansas City, Missouri.

Dear Mr. Washington—Send me Agent's offer. Tell me how to get a free demonstrator heater.

Name.....

Address.....

Territory Desired.....

SEAEVER-WILLIAMS **SW** BOSTON - MASS.



Thousands are Discovering
New Joys—New Worlds!
with these Powerful

BINOCULARS



Tested by the GOVERNMENT

Bureau of Standards at Washington. Used by Army and Navy Officers and Commanders! These are Genuine Imported French and German makes. 8-Power Magnifications. Genuine Prisms. Send NO Money Famous PREMIERE QUALITE—brilliant illumination, exquisite definition. Wide field of vision, many times area of Field Glass. Individual eye strength and width adjustment. Leather Case, neck and shoulder Straps!

Our Plan 10 Days' Trial Absolutely FREE
is Different!

We ask for NO money in advance! NOTHING on Delivery. See, Try, Test, Enjoy BINOCULARS for 10-days' trial, ABSOLUTELY FREE. If pleased you may pay on Budget Plan: \$5.00 MONTHLY. **\$21.75**

or if you prefer to pay cash at end of 10 DAYS, deduct \$1.75 and send Check or Money Order for \$21.75 in FULL SETTLEMENT. Otherwise return them. Order NOW at this Special Price! Send NO Money! Pay NOTHING on Delivery.

SEAEVER-WILLIAMS CO.

Importers, Exporters, International Mail Order House

"2 Generations of Honorable Dealings"

365 WASHINGTON ST., BOSTON, MASS.

Largest Retailers of Binoculars in the World.

Gentlemen:—Send me the 8-POWER BINOCULARS for 10 days' FREE Trial on your "NO Money in Advance—NO Money on Delivery" Plan.

Name.....

Address.....

Clip and mail coupon NOW! If a new customer please tell us something about yourself. We will appreciate and respect the information. THANK YOU. Pop. M. 8-27

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A most complete catalog of everything in Radio. All the latest hook-ups. Sets, Parts and Kits of every description. Live Dealers need this book. Write on your business stationery.

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INDISPENSIBLE

for 100%
Tube Efficiency

Only Amperite supplies automatically the self-adjusting filament current your tubes require. Eliminates hand rheostats. Simplifies wiring. Insist on Amperite. Accept nothing else. Price \$1.10 complete. Sold everywhere. Write for Free Hook-Ups and construction data to Dept. P. M.-9.

RADIALL COMPANY
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REG. U.S. PAT. OFF.

The "SELF-ADJUSTING" Rheostat

PARKS

Manual Trainer

\$35.00

Without Motor

For your home shop! Combination 11-inch band saw and 11-inch wood lathe. If you have a knack for wood working you can turn out first-class bridge lamps, cabinets, furniture, ship models, etc., in fast time. Get one!

Write for specification circular

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BIG RADIO CATALOG

From the "Big, Friendly Radio House"

NEW 1928 Book offers finest, newest well-known sets; parts, eliminators, accessories at lowest prices. Set-builders, dealers, agents—WRITE for this CATALOG!

Western Radio Mfg. Co.

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SOLDERALL

METAL IN PASTE FORM

The Only convenient metal solder

Every Electrical Connection needs Solderall for perfect reception

25¢

The SOLDERALL CO., NEWARK, N.J.

They Give Permanent Satisfaction

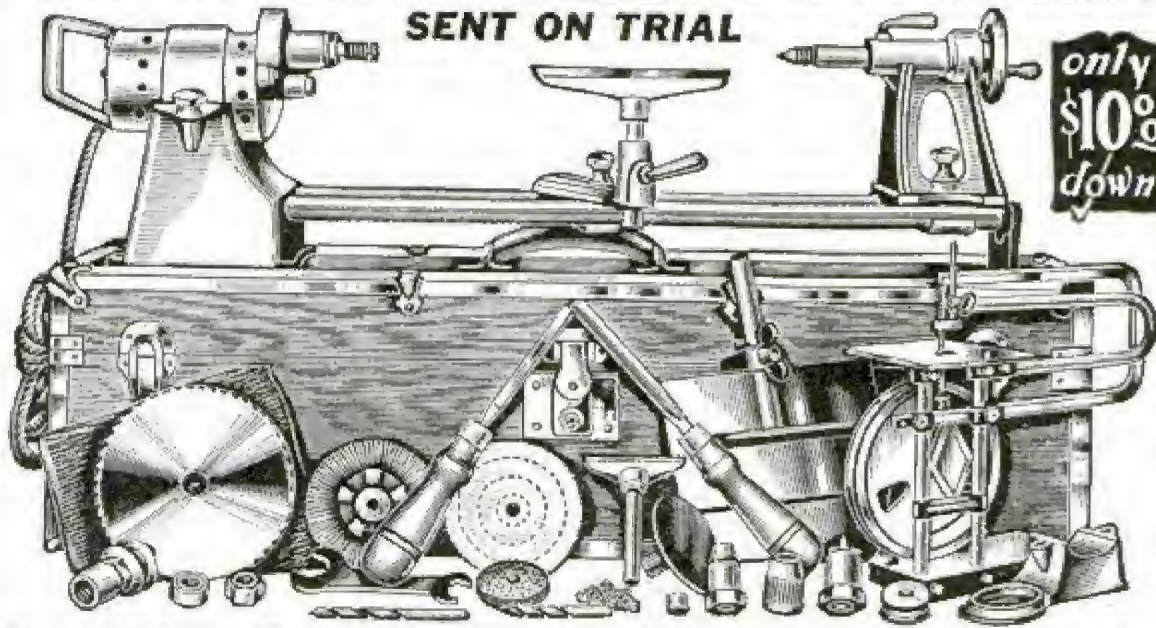
Frost-Radio De Luxe Super Variable High Resistance Units and Rheostats and Potentiometers, both Bakelite and Metal Frame Type must give permanent satisfaction or they would not be used by more than 60 leading set manufacturers. You will like their dependability, their design and fine construction. Ask your dealer to show you the complete line of these parts.

HERBERT H. FROST, Inc., Main Offices and Factory: ELKHART, IND.

NOW! MAKE THINGS AT HOME WITH THE NEW **RED JACKET** HOME WORK SHOP

SENT ON TRIAL

only
\$10.00
down



THE HOME CRAFTSMAN'S LATHE Will Make You a Craftsman

A COMPLETE SET OF PRECISION TOOLS electrically driven that will make you an accomplished workman. It is a chest full of tools that has been designed by a master for the private use of tool lovers and men who want to build, construct, invent and create at home. You will be able to make everything— attractive odd furniture, toys, home and garden improvements, all-around manufacturing, repairing.

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CRAFTS
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BLUE
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The complete equipment consists of the powerful Red Jacket Motor, with direct drive to an accurate wood turning lathe (capacity 9 in. x 34 in.); a bench saw, that has depth and side gauges; scroll and jig saw; and all accessories for both portable and stationary power drilling, buffing, grinding and cleaning. Attaches to any light socket and converts your work bench into a complete private tool and machine shop.

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IF IT IS NOT WHAT YOU WANT
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A SPECIAL CRAFTS COURSE

And blueprint service is free to Red Jacket Shop owners—all that there is to know about handicraft methods, raw materials, woods, carving, sawing, turning, designing, carpentering, decorating, is taught by special correspondence.

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Manager, Dept. 109: Please send me particulars about 10-day free trial, free blue-prints and \$10 down payment.

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When You Want a **BLOTORCH**

That gives 400° more heat—
That's 100% safe—send for

TURNER MASTER No. 45
Only \$7.75, postpaid

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DRIES IN MINUTES!

Valspar Lacquer gives chairs, tables, cabinets, woodwork a beautiful satin finish in any color. Easy to apply—dries in minutes. Send 20c for sampler Red, Blue, Green, Yellow, Orange, Lilac, Brown, Ivory, Coral, Gray, Black, White, Valentine & Co., 450 Fourth Avenue, New York, N.Y.



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Better Than A Brush



The Lacquer-Well Spray Gun

for all brushing lacquers including brushing Duco.

Anyone Can Work It

Lacquer your auto, screens, etc. Make your old furniture like new. Every garage should have one.

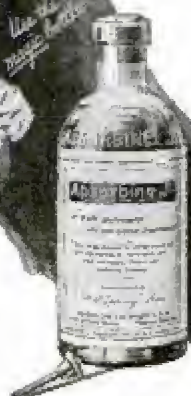
Sent postpaid anywhere in U. S. upon receipt of \$2.50, extra tanks 25c.

THE LACQUER-WELL SPRAY COMPANY
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Relieve the Pain Prevent Infection

Use Absorbine, Jr. to heal cuts, bruises, burns, rash, skin eruptions and to reduce swelling. It's a safe and powerful liniment—a dependable antiseptic.

\$1.25 a bottle at your druggist's
W. F. YOUNG, Inc., Springfield, Mass.



18 Tools In One S&B SAW *Money Back Guarantee* 8" Combination S.B. SAW *15 DAYS TRIAL*

The S&B 8-in. Combination Saw (18 tools in one) is the ideal machine for the shop, factory or the home; will rip, cross cut, bevel, miter, mortise, groove, drill, tenon, grind, rabbet, buff and polish. The greatest machine you ever saw;

\$35

F. O. B.
CHICAGO

no other machines complete and efficient as the S&B—actually 18 tools in one! You will marvel at the wonderful bevel-

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Write for Complete Illustrated Folder

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CHICAGO, ILL.



Belt Tightener

With table raised—saw is guarded ready for drilling, grinding or polishing.



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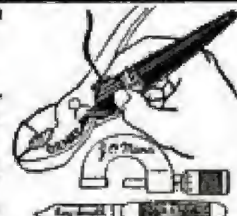
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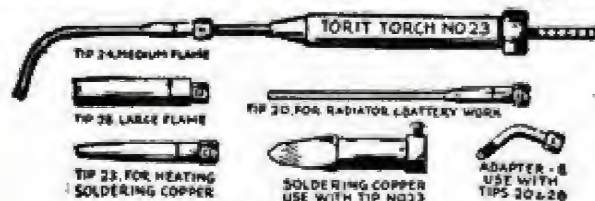
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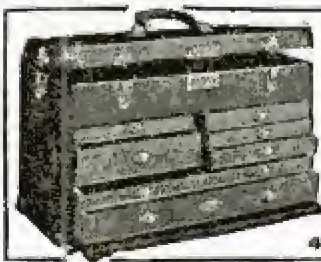
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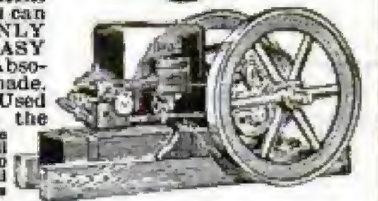
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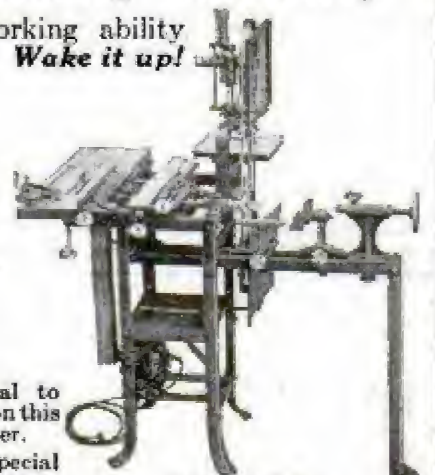
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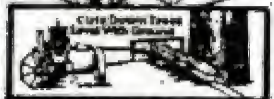
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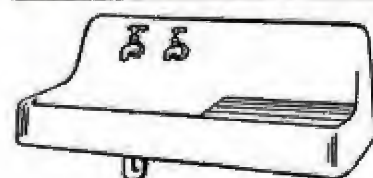
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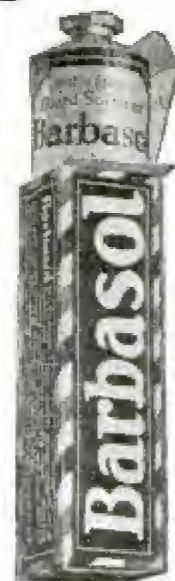
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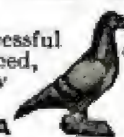
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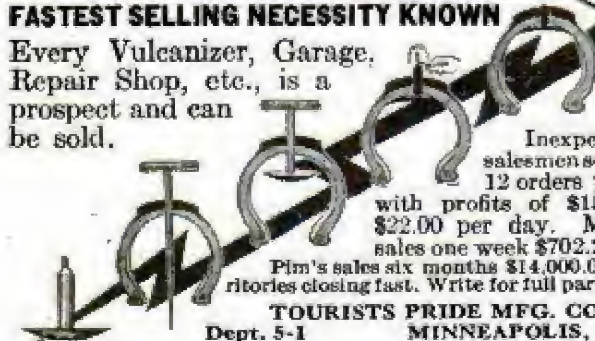
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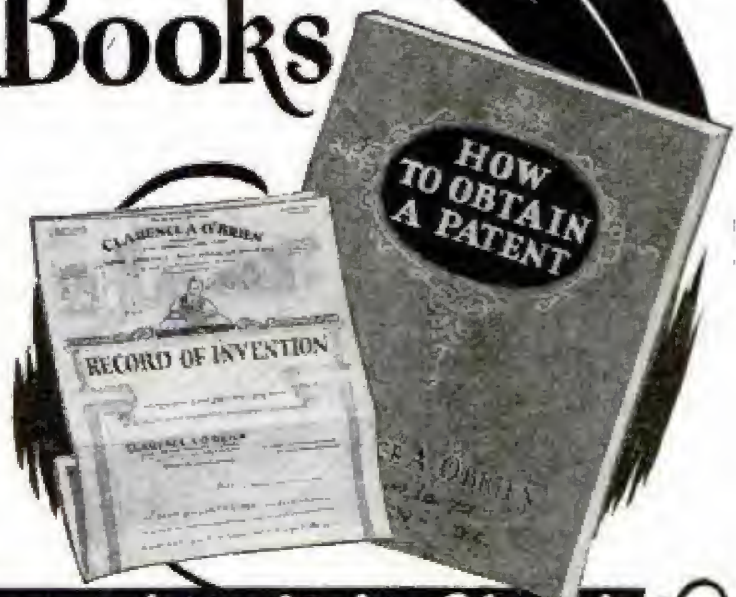
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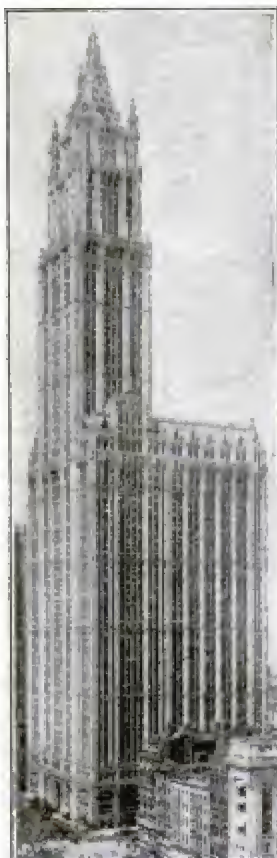
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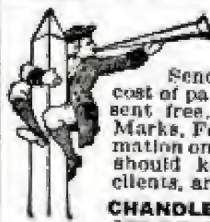
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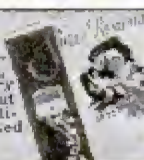
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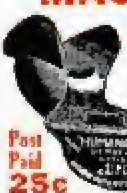


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It is made in the shape of and looks like a regular Automatic Pistol. No one is likely to stop and ask you whether it is real or not. Thus it is likely to prove itself very handy in an emergency. On pressing the trigger it opens up, as shown in the illustration, at the right, revealing nine most useful articles—Opera and Field Glass, Telescope, Mirror, Magnifying Glass and Burning Lens, Reading Glass, Sun Dial, Run Compass, etc. In the handle of the revolver there is a place for various pocket necessities, such as First Aid Articles, Buttons, Pins, etc. The Pistol is of sheet metal, blood finish, that can be carried comfortably in pocket. PRICE \$1.00 postpaid.

Watch Charm Pistol \$1.75



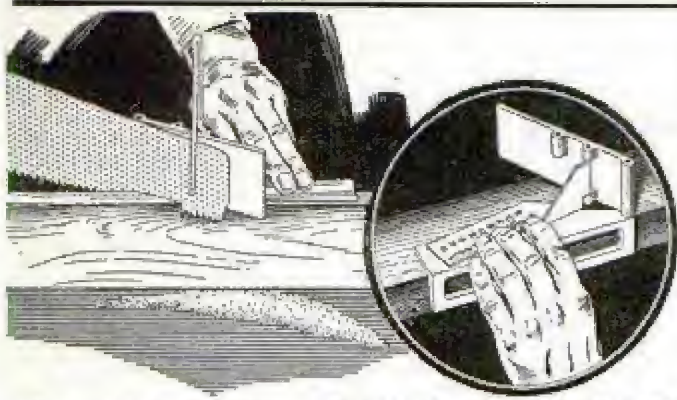
Exact reproduction of a real pistol; actually fires REAL BLANK CARTRIDGES of miniature size. Illustration is actual size. 1 1/4 inches long, with ring at end for attaching to watch chain. Loads like a regular pistol. Pull the trigger and it goes off with a loud bang. Pistol is break open type; Illustration shows position for loading. Made entirely of high grade steel, nickel plated, octagon barrel, handily engraved handles, complete in box with cleaning rod. PRICE \$1.75. Also furnished with pearl handles, \$2.50. BLANK CARTRIDGES, 50c per box of 25. JOHNSON SMITH & CO., Dept. 813, RACINE, WIS.

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You can easily make a highly sensitive detector-phon by using this Transmitter Button to collect the sound waves. You can build your own outfit without buying expensive equipment. It is simple and inexpensive. You can install an outfit in your home and hear conversations being held all over the house. You can connect up different rooms of a hotel. This outfit was used by secret service operatives during the war. It is being used on the stage. It is ultra-sensitive and is the greatest invention in microphones. You can mount the button almost anywhere—ward board boxes, stove pipes, stiff calendars, on the wall behind a picture frame, etc. Button is so light and small it cannot be detected. Persons can be overheard without suspecting it. You can listen in on conversations in another room. A deaf person in the audience can hear the speaker. Connected to phonograph, piano or other musical instrument, music can be heard hundreds of feet away. Button may be used to renew telephone transmitters; often makes an old line "talk up" when nothing else will. The ideal microphone for radio use; carries heavy current and is extremely sensitive. Amplifies radio signals. Countless other similar uses will suggest themselves. Experimenters find the button useful for hundreds of experiments along the lines of telephones, amplifiers, loud speakers, etc. Many fascinating stunts may be devised, such as holding the button against the throat or chest to reproduce speech without sound waves. PRICE \$1.00.

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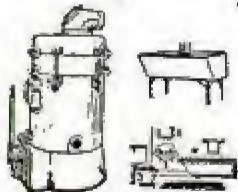
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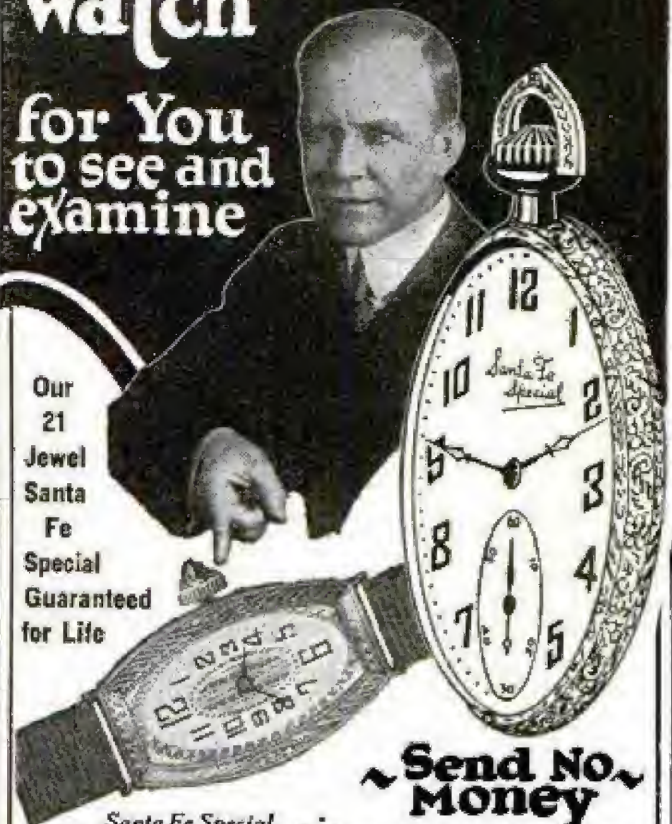
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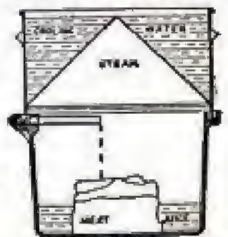
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Dept. P-35

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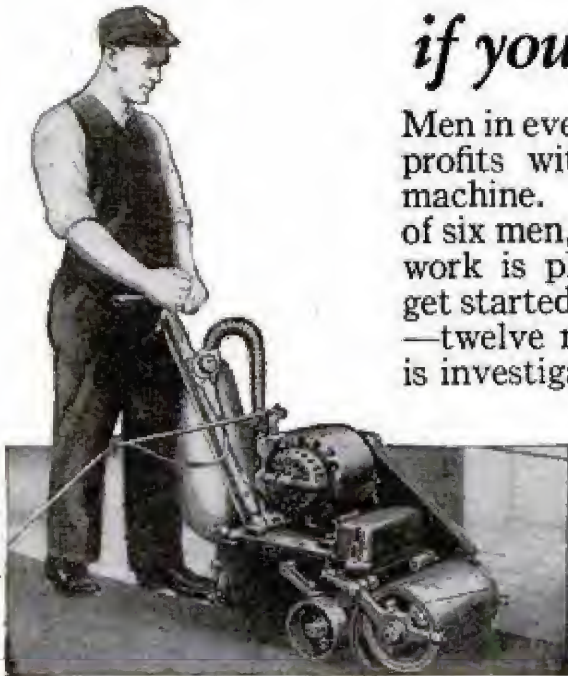
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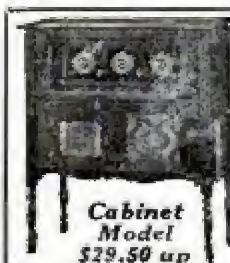
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Model
\$29.50 up**

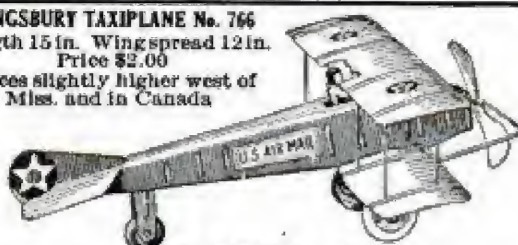
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Is soothing to your stump—strong, cool, neat, light. Easy to wear. Braces for all deformities.

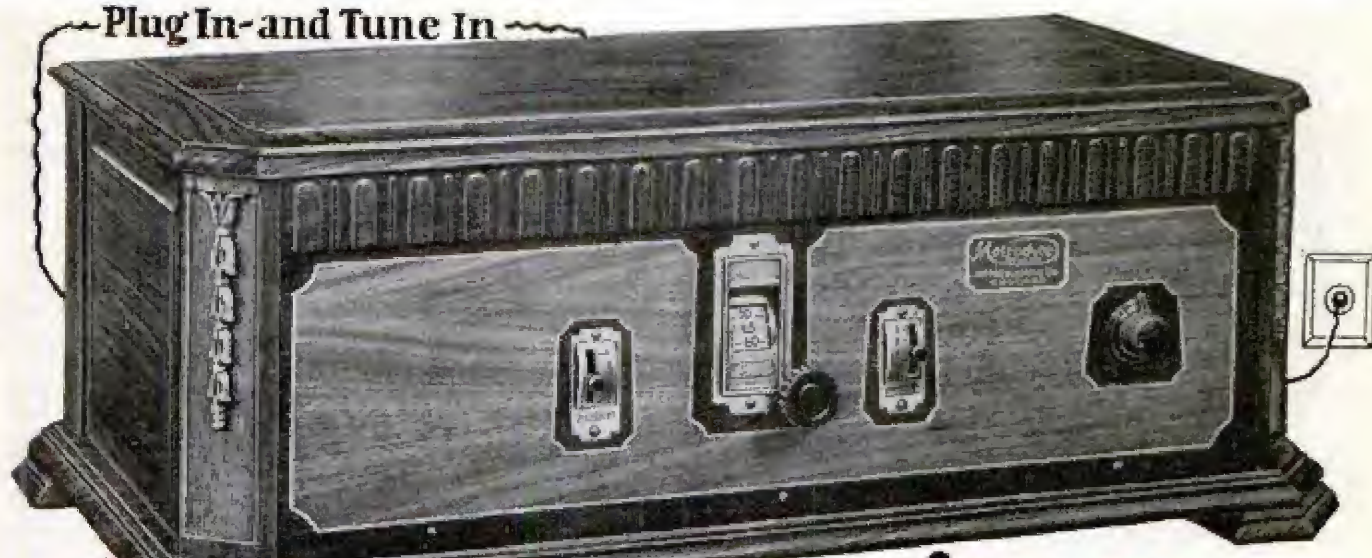
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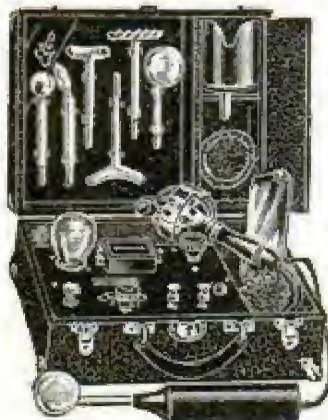
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*The Four Greatest Curative Powers
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Great New Invention!



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**Reduced
Fac-Simile
Gold Medal**

STUART'S PLAPAO-PADS are different from the truss, being mechanico-chemical applicators made self-adhesive purposely to hold the distended muscles securely in place. No straps, buckles or spring attached—cannot slip, so cannot chafe or press against the pubic bone. Thousands have successfully treated themselves at home without hindrance from work—most obstinate cases conquered. Soft as velvet—easy to apply—



Grand Prix

inexpensive. Awarded Gold Medal and Grand Prix. Process of recovery is natural, so afterwards no further use for trusses. We prove it by sending Trial of Plapao absolutely **FREE**

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Name.....

Address.....

Return mail will bring Free Trial Plapao.

Swear Off Tobacco

Tobacco Habit Banished Let Us Help You

Quick Results

Trying to quit the tobacco habit unaided is often a losing fight against heavy odds, and may mean a serious shock to your nervous system. So don't try it! Make the tobacco habit quit you. It will quit you if you will just take Tobacco Redeemer according to directions.

It doesn't make a particle of difference whether you've been a user of tobacco for a single month or 50 years, or how much you use, or in what form you use it. Whether you smoke cigars, cigarettes, pipe, chew plug or fine cut or use snuff—Tobacco Redeemer will positively remove all craving for tobacco in any form in a few days. Your tobacco craving will usually begin to decrease after the very first dose—there's no long waiting for results.

Tobacco Redeemer contains no habit-forming drugs of any kind and is marvelously quick, scientific and thoroughly reliable.

Not a Substitute

Tobacco Redeemer is in no sense a substitute for tobacco, but is a radical, efficient treatment. After finishing the treatment you have absolutely no desire to use tobacco again or to continue the use of the remedy. It helps to quiet the nerves, and will make you feel better in every way. If you really want to quit the tobacco habit—get rid of it so completely that when you see others using it, it will not awaken the slightest desire in you—you should at once begin a course of Tobacco Redeemer treatment for the habit.

Results Absolutely Guaranteed

A single trial will convince the most skeptical. Our legal, binding, money-back guarantee goes with each full treatment. If Tobacco Redeemer fails to banish the tobacco habit when taken according to the plain and easy directions, your money will be cheerfully refunded upon demand.

Let Us Send You Convincing Proof

If you are a slave of the tobacco habit and want to find a sure, quick way of quitting "for keeps" you owe it to yourself and to your family to mail the coupon below or send your name and address on a postal and receive our free booklet on the deadly effect of tobacco on the human system, and positive proof that Tobacco Redeemer will quickly free you from the habit.

Newell Pharmacal Company
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Free Book Coupon

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Dept. 300, Clayton Station, St. Louis, Mo.

Please send, without obligating me in any way, your free booklet regarding the tobacco habit and proof that Tobacco Redeemer will positively free me from the tobacco habit or my money will be refunded.

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Street and No.....

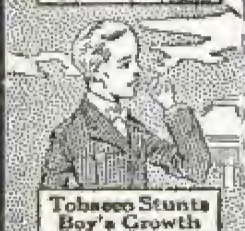
Town..... State.....



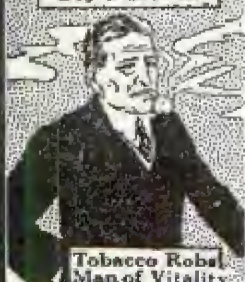
Tobacco Tells on
Nervous System



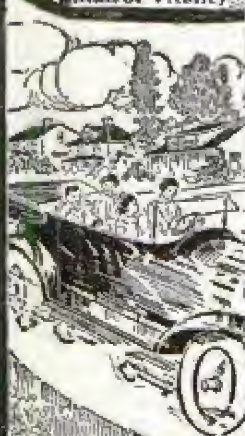
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Digestion



Tobacco Stunts
Boy's Growth



Tobacco Robs
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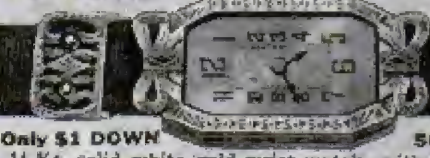
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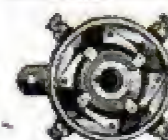
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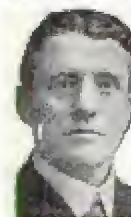
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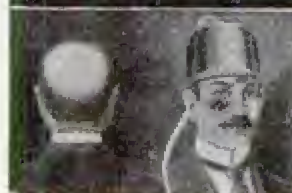


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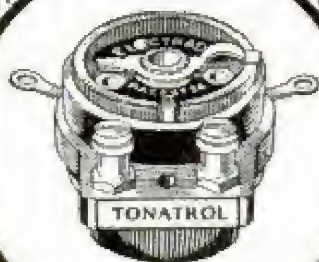
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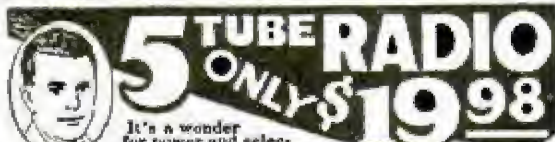
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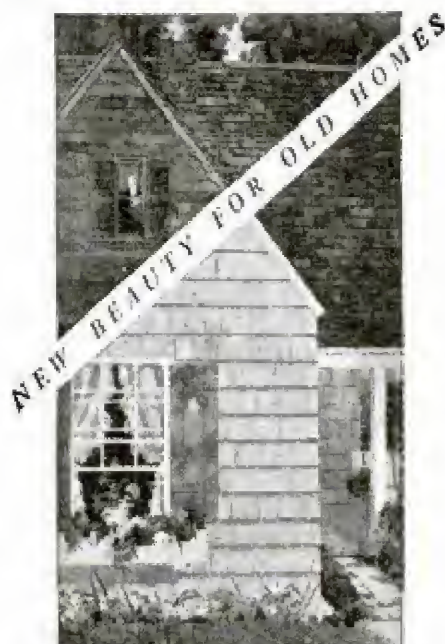
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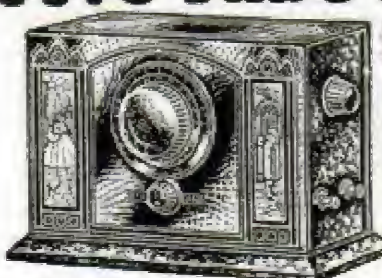
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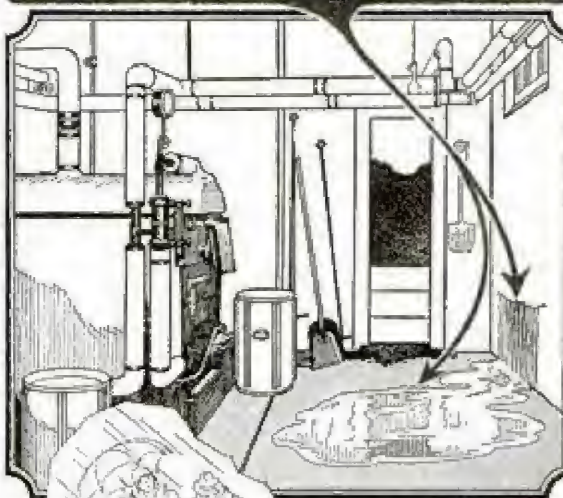
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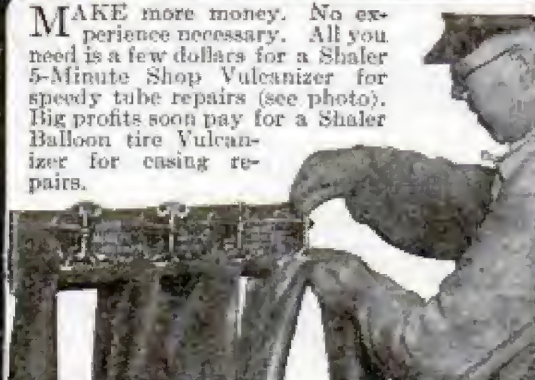
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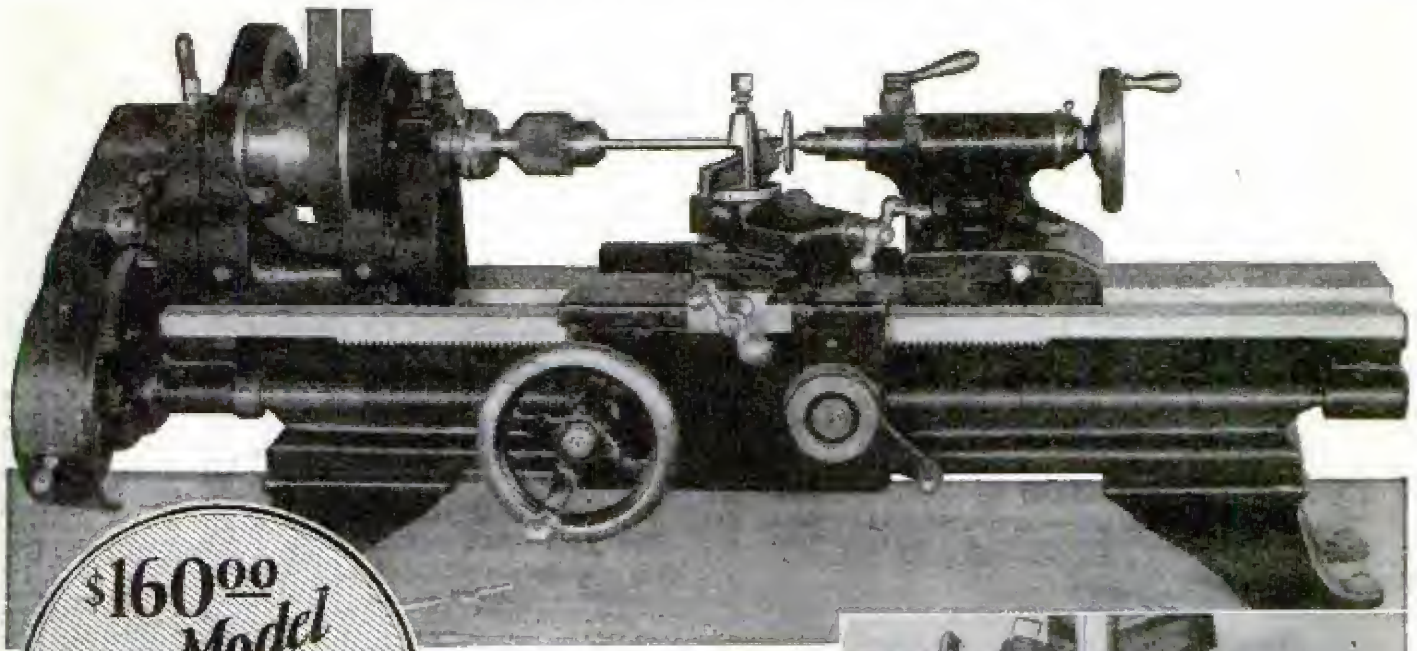
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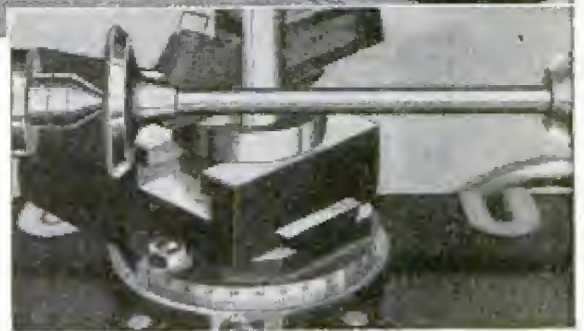
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Screw Cutting
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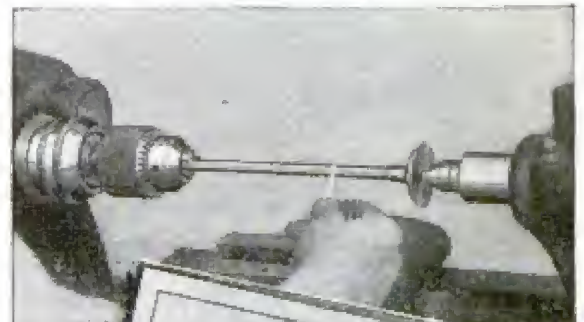
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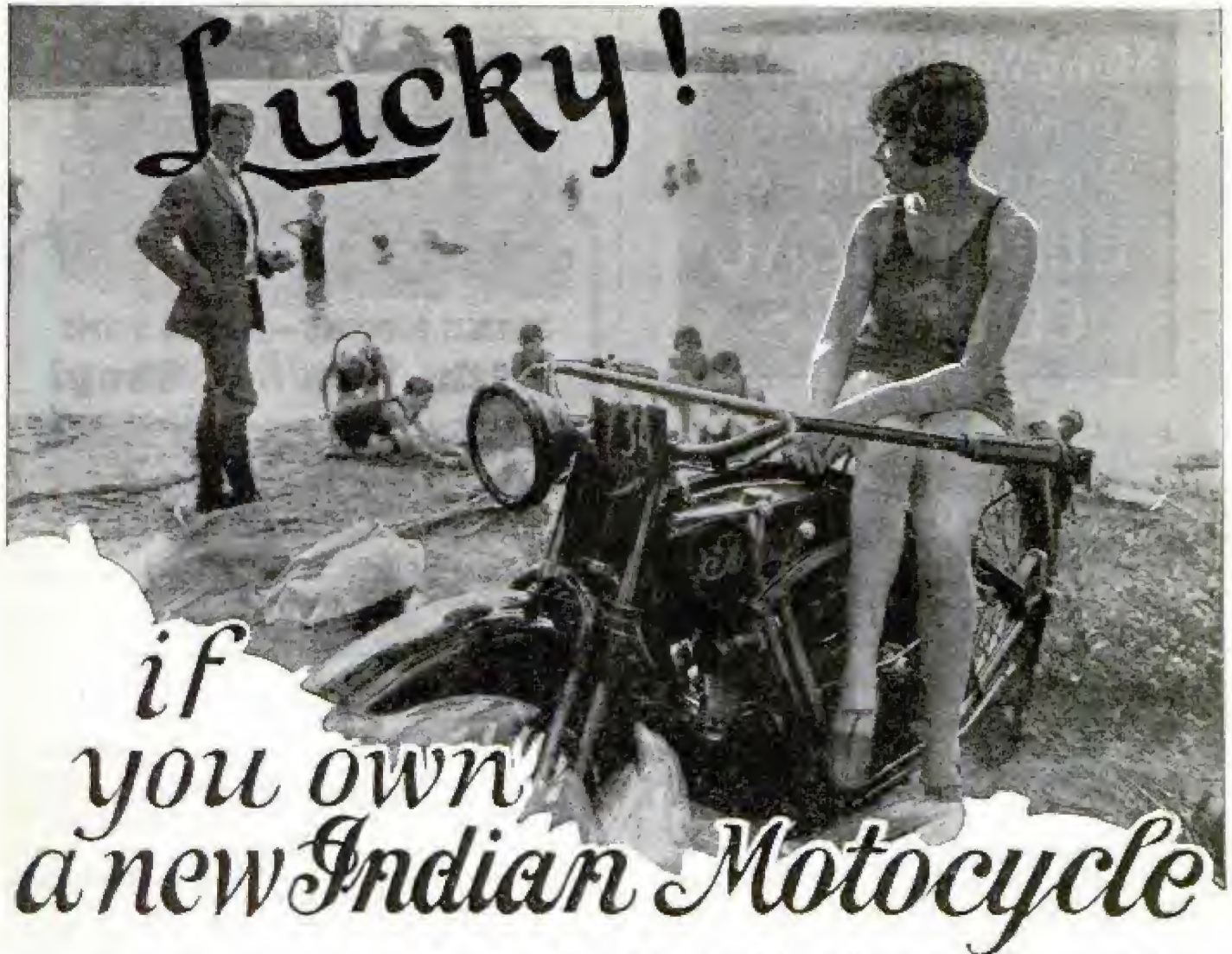
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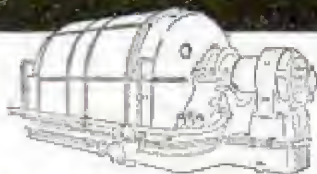
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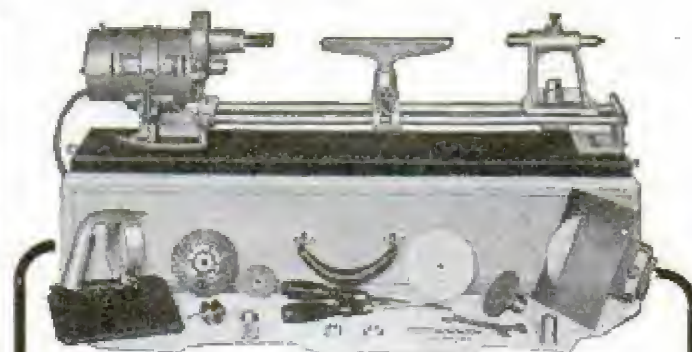
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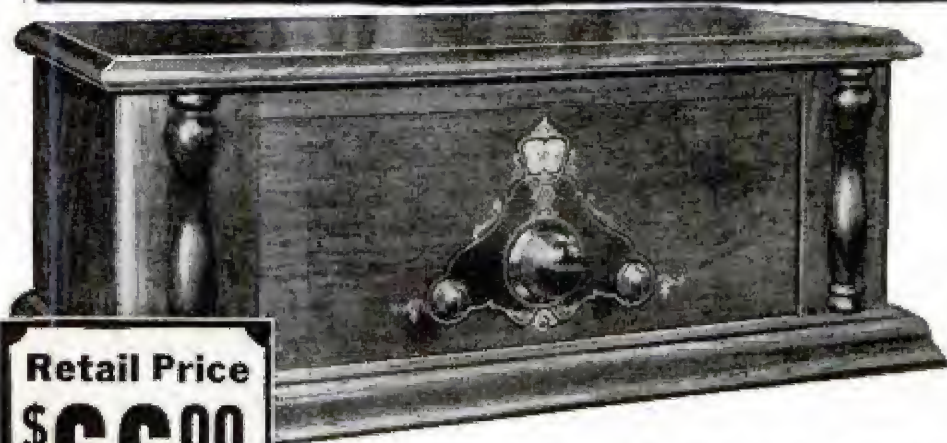
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30 Days Trial



Retail Price

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**6 Tubes
ONE DIAL**

New 1928 Models
6 Tubes
Shielded Set
ONE DIAL
Westgale
RADIO

NOW—the new 1928 Westgale Radio Models are ready for you to try. And we stand ready to put any one of our ten new models in your home and let you use it to your heart's content on 30 DAYS' TRIAL. Entertain your family and friends. Listen to programs from all over the country—see the latest style period type cabinets—note the selectivity, distance and volume—hear the rich, deep, mellow tone—then if you are not convinced that Westgale gives you more for your money than you can get elsewhere—YOU DON'T HAVE TO KEEP IT.

Don't buy any Radio until you send the coupon for our catalog which pictures and describes these new 1928 models in 5-tube, 6-tube, and 7-tube sizes offered in a beautiful array of table models, consoles and DeLuxe Baby Grand styles. Why take chances when you can take your choice of these last minute models and put them in your home on 30 Days' Trial?

**The Utmost in Distance, in Volume
and in Lifelike Tone**

Thousands of Westgale sets have been

sold. For years we have maintained a reputation of being first with the latest in Radio. These new 1928 models are no exception. Every late feature—every new, worthwhile idea is embodied in their make-up—the last word in every way, and priced at just about half the usual cost. Send for our catalog and find out all about their many superior features at once. Don't wait—a



**SPECIAL
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for those who write quick. Mail the coupon today. Get posted before you buy.

**Our De Luxe
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**Why Not
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We want Agents and Dealers in every locality to demonstrate and take orders for these amazing new 1928 Westgale Models. This is your chance to get a Westgale Radio at a big discount and make it pay you big money. Millions of radios will be sold this season. Get a Westgale set on 30 Days' Trial—demonstrate to your neighbors and friends and get your share of these big radio profits.

Your Radio FREE

Our new Catalog also explains a plan whereby you can put a Westgale Radio in your home on 30 Days' Trial—demonstrate it to your neighbors in spare time and get your own set without cost before the trial period is up.

Special Discount to Agents

To quickly introduce these wonderful new 1928 models we are offering for a limited time a big reduction, way below retail prices on the FIRST Westgale set placed in each community. So get busy now. Be first in your locality to mail the coupon for our FREE catalog and get full particulars of this special discount offer.

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A tremendous Crosley radio achievement 1927-28

RECENT court decisions which clarified the radio patent situation have paved the way for still greater Crosley triumphs. Now—completely available to Crosley—and amplifying Crosley supremacy in fullest measure, are the enormous resources, great discoveries and ideas embodied in patents of

- 1—The Crosley Radio Corporation.
- 2—The Radio Corp. of America.
- 3—The Westinghouse Co.
- 4—The General Electric Co.
- 5—The American Telephone & Telegraph Co.
- 6—The Hazeltine Corporation.
- 7—The Latour Corporation.

under which Crosley is now licensed to manufacture. Here are the seven big things which represent radio's greatest advancement, brought together by Crosley and combined with the experience, mass production method and leadership of the Crosley organization. No wonder a waiting radio world pronounces the "Bandbox" at the unprecedented price of \$55, Crosley's paramount achievement.

The Bandbox is Shielded

Radio coils are surrounded by magnetic fields similar in every respect to the magnetic field around the earth that moves the needle of a compass but around radio coils these fields make nuisances of themselves by feeding back on each other. Heretofore it has been customary to make inefficient coils with inefficient fields to prevent such feeding back. The Crosley Bandbox incorporates copper shields around each coil to prevent such feeding back. The coils consequently can be made and are very

much more efficient. The amplification of the receiver is, therefore, much higher—the sensitivity is greatly increased. Condensers are also completely shielded from each other in separate metal compartments. Hitherto, only high priced sets have enjoyed this super radio advantage.

There Is No Oscillation

The Bandbox employs completely balanced or neutralized radio frequency stages to prevent oscillation, instead of the common form of lossier method. More costly, to be sure, but extremely necessary in achieving such results as are obtained by this marvel of radio reception.

For Sharpness—The Accumulators

"Bandbox" accumulators enable "fishers" for distant stations to bring them in loud and clear. As powerful telescopes magnify distant scenes, accumulators increase

the volume of far-away signals so they seem like local programs.

Volume Control

This is another big "Bandbox" feature which permits full brass band power for those who want their dance notes strong and loud. For others, it cuts volume down to a soft and gentle murmur, without distortion.

Illuminated Dial

A Master Station Selector has an illuminated dial for easy reading in shadowy corners. A single knob permits full tuning for ordinary reception of local, nearby and super-powered stations.

Installation Simplified

A woven cable, containing vari-colored rubber covered leads makes installation and hook-up easy for the veriest novice. No waiting for the radio service man, should the batteries be changed.

Easily Adapted to Consoles

Simply remove screws in escutcheon and in base of set. Lift off metal case. Chassis now stands ready for installation in console cabinet. Opening in console cabinet permits control shafts to protrude. Escutcheon screws in place and—Presto! the console radio is complete.

CROSLEY RADIO

Crosley Radio is licensed only for Radio Amateur, Experimental and Broadcast Reception

Crosley recommends the use of five power tube, or Cunningham equivalent prices, with each Bandbox. While gives a superior performance for 135-



201-A Radiotrons and one UX171 lens which are furnished at standard Radiotron UX-171 is 180-volt tube, at volt "B" batteries.

THE CROSLEY RADIO CORPORATION
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IMPROVED MUSICONES

Although Musicones improve the reception of any radio set, they are perfect affiliates in finish, beauty and re-productive effectiveness for Crosley Radios. A new model built in the form of a Colonial Tilt-Table with brown mahogany finish, stands 3 feet high. Price \$27.50.

16-Inch Super Musicones (As pictured with Bandbox) \$12.75
12-Inch Ultra Musicones \$9.75

For AC Operation a special Bandbox is available at \$65, wired especially for use with the Crosley Power Converter at \$60. This special Bandbox utilizes the new R. C. A. AC tubes which have made the operation of radio receivers direct from house current so simple, efficient and dependable. The first three tubes employed in the AC model are UX220. These go into the radio frequency sockets. The detector tube is UX 227, with indirectly heated emitter. Another UX220 is used in the first audio stage. Ray A C current heats the filament of all UX 220 tubes. Power tube UX 171 is in the last audio socket. This makes the "dog house" rumble sonorously and the bass drums deeply boom.

The Power Converter

The power converter which smooths the alternating current is a marvel of engineering ingenuity. Only half the size of an ordinary "A" storage battery, it supplies the required A, B, and C currents, without hum. Finished in brown frosted crystalline. There are models for 25 and 60 cycle current. A snap switch shuts down the set and power converter completely.

Price of Power Converter—\$60

You owe it to yourself to see the "Bandbox" and listen to its remarkable performance. If you cannot easily locate the nearest Crosley dealer, his name and address will be supplied on request. Write Dept. 15.

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President



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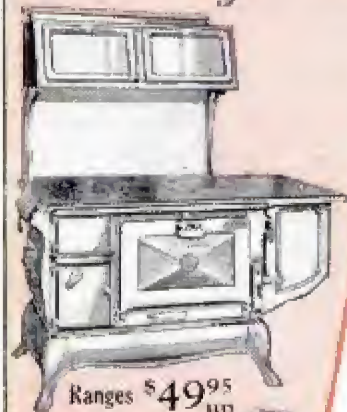
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